

THE IRON AGE

Established 1855

New York, March 26, 1914

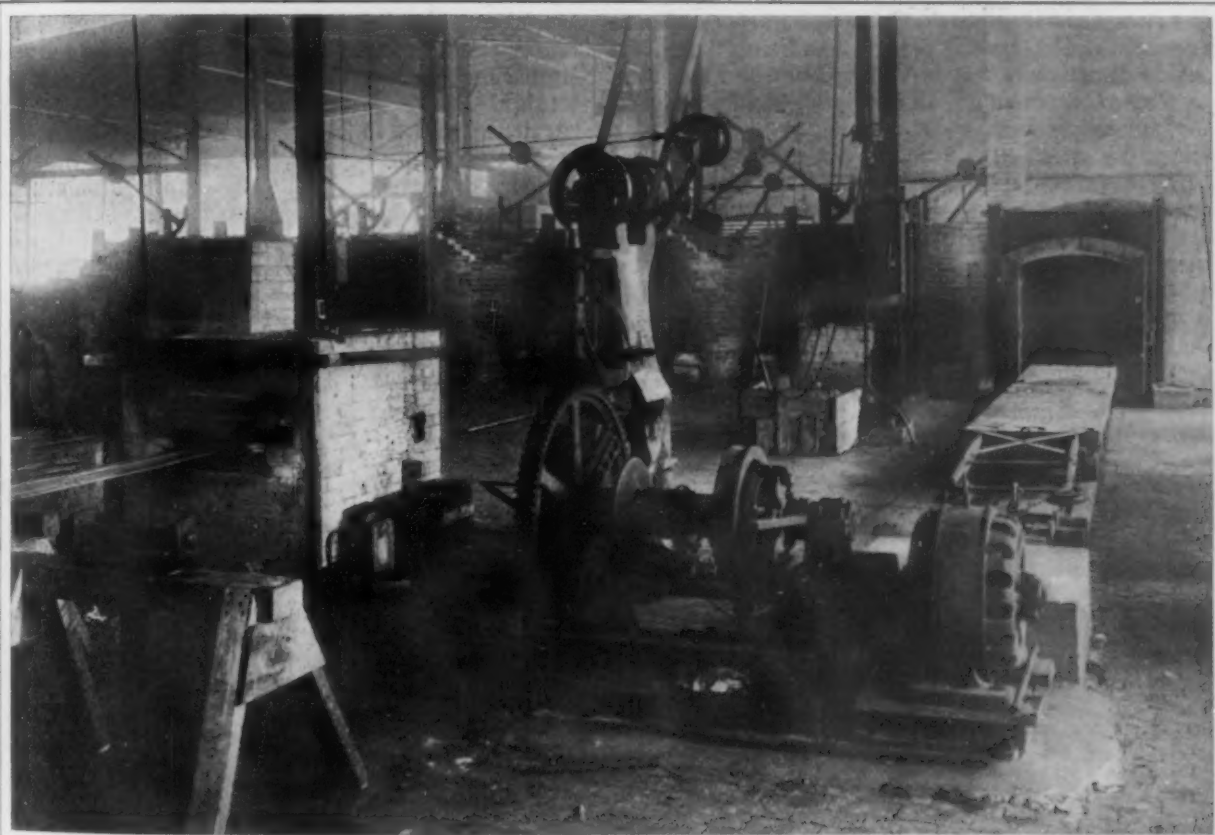
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A Modern Plant Making Cold Drawn Steel

Methods and Processes Employed by the
National Drawn Steel Company—Unique
Building Construction to Secure Daylight

There is a constantly broadening field and increasing demand for cold drawn steel and makers of these products have kept abreast of other manufacturers in improving their processes and products and in devising methods for reducing the cost of production. An example of an up-to-date plant for the cold drawing of steel is found in that recently placed in operation by the National Drawn Steel

from 3-in. rounds down to No. 5 gauge, is used in the cold drawing processes. Soft steel is most generally used for special shapes. The products made by the cold drawing process include drill rods for twist drills, taps, reamers and other small tools, cold drawn tool steel of all descriptions, alloy steels, special shapes, watch wire, needle wire and high-grade wire for a large variety of purposes. The



View of the Electrically-Operated Equipment for Charging the Larger of the Annealing Furnaces in the Background

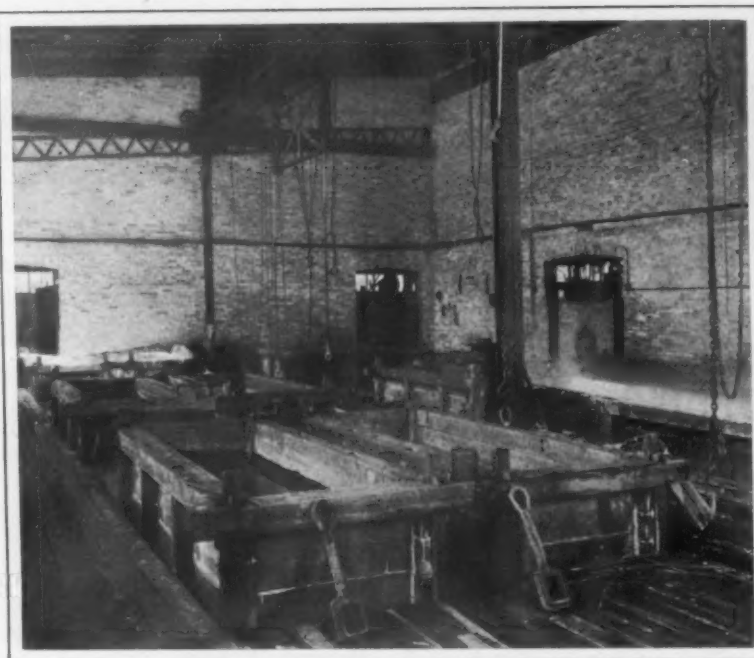
Company, East Liverpool, Ohio. The processes employed and equipment used in the operation of this plant are of much interest, as are also the unique features of the building construction to provide a maximum amount of outside lighting and the arrangement of equipment and routing of material to effect plant economy.

A wide variety of stock, ranging from soft steel bars up to the highest grades of crucible tool steel and including various alloys and hot rolled tool steel

steel is drawn into rounds, squares, flats, hexagons and in various special shapes. Cold drawn special shapes are claimed to be superior to those that are milled for the reason that they are closer to the dimensions desired, have a better finish and are usually cheaper. The waste of steel in the milling operation is almost entirely avoided in cold drawing. Shapes are made in wire of very small sizes up to sizes equal in area to a 3-in. round bar. Wire is drawn as small as 0.008 in. in diameter.

The larger stock is received at the plant in straight bar sections usually in 20-ft. lengths and small stock comes in coils. The first operation is pointing so that the stock will go through the dies. This is done on two pointing machines, a large one for large stock and a small one for small material, these machines being a type of hammer. Some round wire has to be rolled to the sizes required for drawing. This is done on three stands of rolls $2\frac{1}{2}$ and $4\frac{1}{2}$ in. face width and 6 and 8 in. in diameter. The rolls are electrically driven by a motor connected to a lineshaft.

After pointing the stock is annealed, five annealing furnaces being provided for that purpose. These furnaces are of special design, one being 6 x 27 ft. inside dimensions for annealing bars and the four smaller ones, which are 10 ft. square inside, are used for annealing coils. The former is also used for annealing pots and is fired by natural gas, that fuel being regarded as the best suited for the type of furnace used for this work. The smaller furnaces are coal fired. The method of charging the larger furnace is quite unique. It is charged electrically by a 5-hp. motor that operates a drum to which a cable is attached. A charging device running on a track, that is propelled backward and forward by the cable, shoves the buggy loaded with material into the furnace. The motor and drum are located about 25 ft.

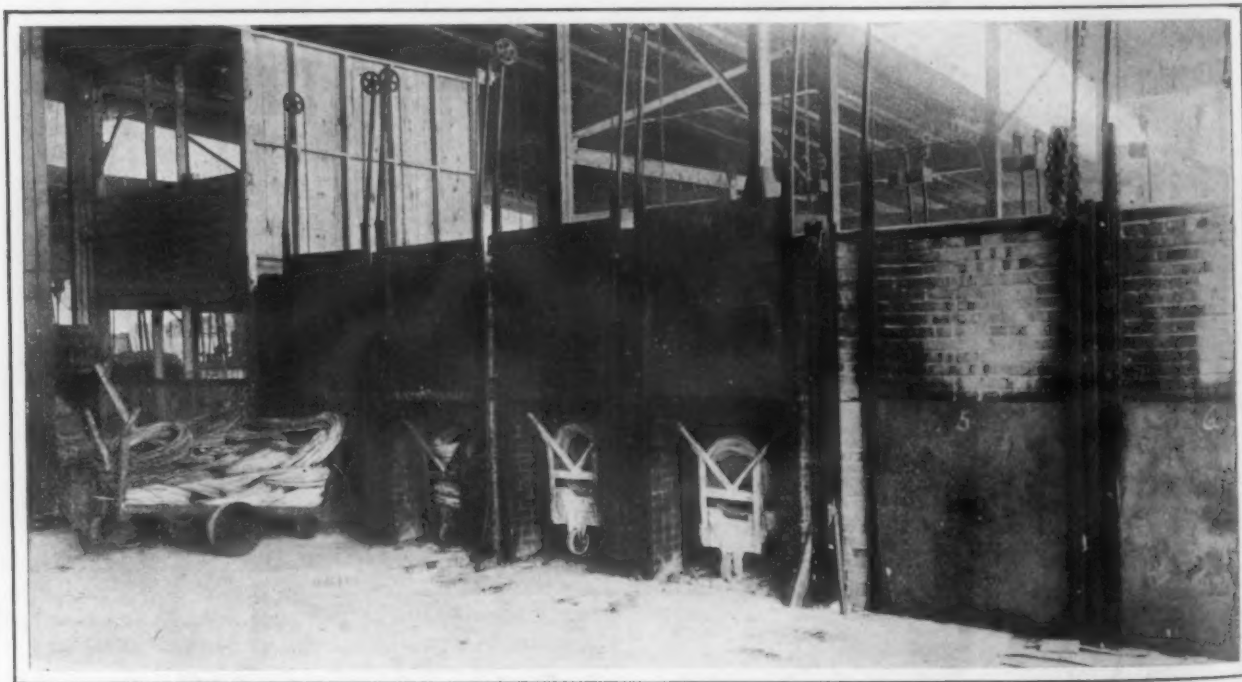


The Cleaning Room and Some of the Pickling Tanks and the Twin Pneumatic Hoist

from the furnace door and in charging the furnace the cable passes around a pulley block near the furnace entrance. When the annealing is completed the charging device is again pushed into the furnace and coupled to the buggy by an automatic latch. Then the cable is arranged for a direct draw and the charging device and buggy are pulled from the furnace. The buggy is a large flat casting that moves over sets of rollers.

Coils are charged into the smaller furnaces from specially designed cast-iron trucks that are used in hauling the stock from one part of the plant to the other during the process of manufacture. These trucks are about 6 ft. long with two wheels at the center and a balancing wheel at each end and are designed for the convenient stacking of both coils and straight stock. The stock is left in the annealing furnaces from 4 to 24 hr. and is subjected to a temperature of from 1150 to 1400 deg. F., the time and temperature depending on the grade of steel. A Brown recording pyrometer is connected to the furnaces for taking the temperature.

After being taken from the annealing furnaces the bar stock is placed in a soaking pit to be cooled. Wire stock not only has to be annealed slowly, but also to be cooled slowly to secure the best results. Were the coils taken directly from the ovens to the open air they would not be thoroughly annealed and



The Baking Ovens and the Trucks on Which the Stock Is Handled

there would be trouble later in drawing the wire, as well as lack of uniformity in the finished product. To obviate this difficulty cooling chambers 6 x 10 ft. are provided at the back of the annealing chambers of the smaller furnaces and the wire after being annealed is pushed through into the adjoining cooling chamber where it remains for several hours in a temperature of 500 to 600 deg. F., and where it is gradually cooled to that temperature.

The stock next goes into the cleaning room where the treatment it receives depends to some extent on the grade of steel. The steel is first placed in pickling tanks where it is left from 45 min. to 12 hr., the average time being about 2 hr. On removal from the pickling tanks it is thoroughly washed under a stream of water turned on at high pressure, and after being washed it is dipped for a moment in a solution of lime and water, which leaves the stock with a coating of white. It is stated that this

matic hoist, each hoisting unit being composed of two Chicago Pneumatic Tool Company's hoists connected by a framework and placed about 8 ft. apart. Suspended from each hoist is an Alliance Brass & Bronze Company bronze yoke. The yokes support a movable bar on which the coils of wire rest when they are dipped in the tanks and on which they hang suspended when being washed. In the view of the cleaning room the yoke is shown leaning against the tank. When the cleaning operations are completed the coils are again placed side by side on the trucks and are taken to the drying boxes where they are somewhat similarly handled with pneumatic hoists. Straight bar stock is handled in the cleaning department with the same twin hoisting equipment. The hoists are arranged to act in unison or independently as desired, so that by raising with one when the other is not operated the load can be tilted when desired. Stock is put through the process of



Some of the Wire Drawing Blocks

coating of lime helps to remove any acid that may be left on the stock after washing, assists in the baking process and after the steel is baked it also acts as a lubricant and makes the drawing of the metal easier. Just outside the cleaning room in the adjoining baking department are two drying boxes that look quite similar to pickling tanks except that they have open ends. After being dipped in lime the stock is placed in these drying boxes and the coating of lime is dried with an air blast furnished by a Sturtevant blower located a short distance from the open end of each drying box.

The cleaning room which occupies one corner of the building, 40 x 80 ft., and is separated from the remainder by a brick partition, is equipped with 13 acid tanks, 5 lime tanks and 1 water tank. Most of these tanks are 10 ft. long, 4 ft. deep and 3 ft. wide. Three tanks 20 ft. long are used for bars. The cleaning room is conveniently arranged with handling equipment so that the material is handled entirely by machinery while being moved about in this room. It is served by two hand traveling cranes, each with a 40-ft. span, that run crossways. Running lengthways on each crane beam is a twin pneu-

annealing, pickling and baking in lots of 500 to 2000 lb. and that amount of coil or straight material is handled at a time on the hoists and trucks.

After drying the stock goes to the baking ovens, which are located a few feet from the drying boxes. Here the steel is allowed to remain from 12 to 20 hr. and is baked at a temperature of about 500 deg. F. Baking after pickling dries the acid out of the stock, which would be brittle were it not baked. There are two adjoining gas-fired ovens, each 18 ft. wide and 27 ft. deep, both ovens having four doors on each side. All of the four sections of an oven have sufficient space for three loaded trucks, making a total baking oven capacity of 24 truck loads. After baking the trucks are taken from the ovens through the doors on the sides opposite to where they were taken in.

After baking the stock is ready for drawing. Coiled wire is drawn through dies on wire drawing blocks and heavy bars are drawn on straight draw benches. The speed at which the drawing is done depends on the kind of steel and size of stock. About 99 per cent. of the stock is given two or more passes through the dies and some complicated shapes re-

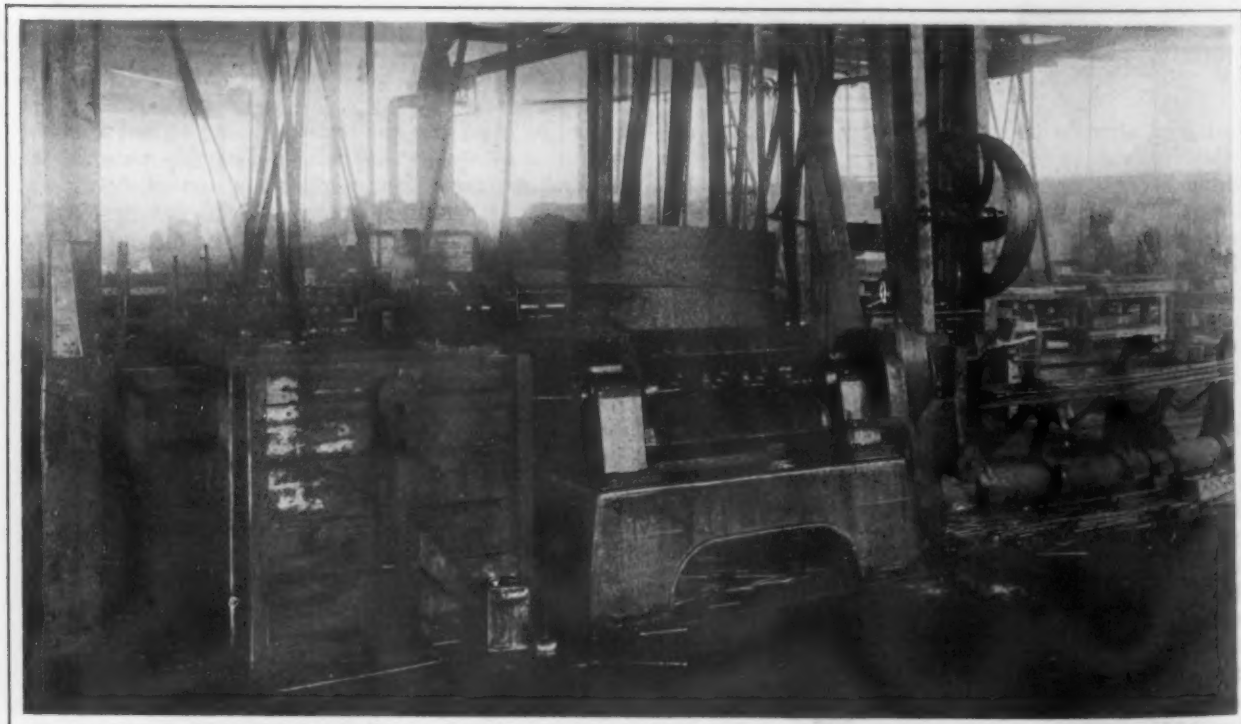
quire as many as 15 passes. After every pass the stock is again annealed, cleaned and baked so that a large part of the steel has to go through the plant several times and considerable time is required for the various operations and processes necessary before the steel is ready for shipment. If the stock is to be polished it is taken to the cleaning department after the final pass and treated with a solution of muriatic acid and then baked before being polished. The plant is equipped with about 50 wire drawing blocks, the most of which were built by Taylor, Vaughn & Taylor, Cuyahoga Falls, Ohio, and with two straight benches for straight stock. Each coiled wire drawing unit, consisting of several blocks, and each straight bench is driven by an individual motor, which range in capacity from 15 to 50 hp. The blocks are driven by a lineshaft with a train of gears to the motor. The blocks turn loose on vertical spindles geared to the shaft and are dropped into mesh with the gearing on the spindle by a foot lever. The gearing and motors are located in a pit under the floor through which the spindles extend up to the machines. This pit affords ready access to all parts of the machinery. Should a break occur one spindle can be removed and the remainder of the blocks in the unit can be kept in operation.

The making of the dies is an interesting feature of the plant. Dies must be of steel that is elastic so that if a die becomes enlarged it can be shrunk to the proper size. As sizes such as 1 in. and $\frac{7}{8}$ in. are drawn to within 0.001 in. of the exact size and such sizes as $\frac{5}{16}$ and $\frac{3}{8}$ in. within 0.0005 in., if required, accuracy in the dies is very essential. The dies are made of carbon steel of various analyses and of high carbon crucible alloy steel. Different details are followed in making the dies, depending on the number of passes. The first operation is making a template of $\frac{1}{16}$ -in. sheet steel. Then a tapered punch is made to fit the template. With this the die blank is punched to the required size, a separate die being made for each pass, the size of each die opening being made a little smaller than the previous one. In order to get a bearing the dies are punched on each side. The dies are punched hot, then hardened and tempered. Two special furnaces are provided for their heat treatment.

After drawing the stock is given the finishing operations of polishing and straightening. All the smaller sizes are polished by being drawn through a doubled piece of Brussels carpeting on which is sprinkled a polishing compound. The wire up to this point is in coils, being recoiled after each operation. Straightening is done on 10 geared motor-driven straightening machines that at the same time automatically cut the stock to length. Separate machines are provided for straightening rounds, squares and flats. Some of these machines were furnished by the F. B. Shuster Company, New Haven, Conn., and others were built to the National Company's design. For straightening and polishing the larger sizes of rounds in one operation the company has designed a machine that passes the bars through six sets of steel rolls beveled in such a way that the stock is taken through automatically without affecting its accuracy in size. When a highly finished product is desired it is further polished on buffing machines.

Drill rod stock is usually cut to 3-ft. lengths and is stored in door-inclosed wooden racks with most of the compartments 7 x 7 in. and 12 x 12 in. in size. In order to keep the stock in good condition it is kept at an even temperature by steam pipes beneath the storage racks. Nearly all the stock is boxed for shipment.

The company's plant is an interesting example of modern daylight factory construction, the building being almost wholly of steel and glass. While electric lamps are provided it is stated that some of the work in connection with wire drawing cannot be done satisfactorily with artificial illumination and for this reason the plant was designed to provide a maximum amount of outside lighting. The plant is 210 ft. long x 160 ft. wide. On one side a brick wall extends up 9 ft. and on the other three sides the wall is brick only 6 ft. from the floor level. Above these walls the building is entirely of glass and steel to the roof, the sides being continuous steel sash furnished by the Trussed Concrete Steel Company and fitted with ribbed glass. Owing to the extreme width of the building a unique roof construction has been provided to increase the outside lighting surface further and to furnish light in the interior from



A Specially Designed Machine for Polishing Bar Stock by Passing It Through Sets of Beveled Rolls

above. The roof is divided into five bays, each about 50 ft. wide and slanting each way from the peak. The roof is about 8 ft. higher over the two outside and center sections than it is over the two intervening sections. This difference in height provides a vertical space for 6 ft. of glass on the sides of the sections between the lower and higher parts of the roof.

The plant is arranged for carrying out the manufacturing processes with as little handling as possible, the points at which the successive operations are performed being as small a distance apart as is practical. The entire interior is one room with the exception of the cleaning department, which is in one corner of the rear section. Near one corner at the front end of the building is the receiving entrance and stock is taken into this directly from the cars, the plant floor being on a level with the car platforms. A large section in this corner is used for storage. From the storage room the stock is taken to the pointing machines, rolls, annealing furnaces, cleaning room, drying boxes, baking ovens, drawing blocks, then back down a center aisle to the annealing furnaces and over the same route when the processes are repeated, and finally to the straightening and polishing machines and finished stock and shipping department, the last being located at the front of the building in the corner opposite the stock-room. From a door at this corner the finished product is loaded directly on cars. The plant is located on a six-acre site on the bank of the Ohio River and along the Pennsylvania Railroad. The offices are located in a separate building a short distance from the plant.

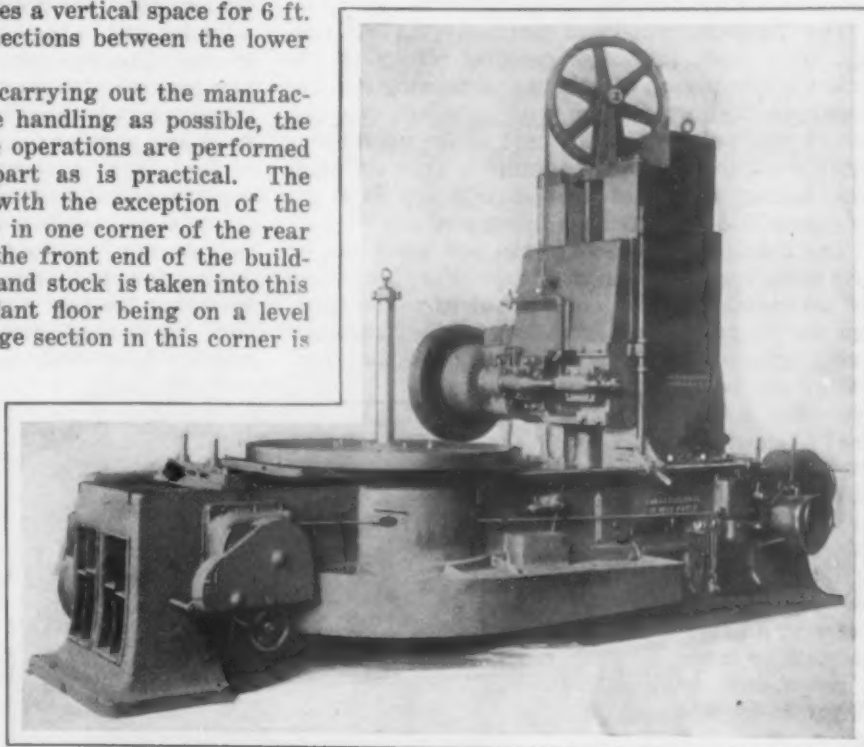
The company was recently formed with a capital stock of \$100,000. It took over the stock of the Kidd Brothers & Burgher Steel Wire Company, Aliquippa, Pa., and operated the plant at Aliquippa until the present one was built. Its officers are Cornelius Cronin, president; John G. Palmer, vice-president and sales manager; R. H. Perry, secretary; John S. Scott, treasurer; Rutherford Burgher, general manager, and Arthur Machen, superintendent.

Large Automatic Gear-Cutting Machine

One of the largest gear cutting machines ever built has been completed by Gould & Eberhardt, Newark, N. J., for Foote Bros., Chicago. This machine is of the vertical cutting type and although designated by the builder as a 120 x 20 in. machine it will cut spur gears up to 144 in. in diameter and a face width of 24 in. It also has a capacity for cutting steel gears up to 4-in. circular pitch. The machine is entirely automatic and its construction embodies a number of the features found in the builder's smaller machines. A wide range of cutter feeds and speeds is provided and the feeds, which are independent of the speeds, can be conveniently changed through an improved gear box.

On account of the very heavy gears which the machine was designed to cut, the indexing worm-wheel is mounted in a fixed position and the stanchion carrying the cutter slide is adjustable by hand or power to accommodate different diameters of gears and for setting the depth of cut. The worm-wheel is of the split rim type and the indexing and feeding mechanisms are connected with a system of

interlocking levers which are arranged so that it is impossible for the feed clutches to engage until the indexing has been completely and



One of the Largest Machines Ever Built for Cutting Spur Gears. Its Capacity Is Up to 144 In. in Diameter and 24 In. Face Width

accurately performed. The speed of the indexing wheel can be varied to suit the different sizes of gears.

The cutter spindle is driven by a worm and wormwheel with a heavy flywheel mounted on the end of the main spindle. The machine is also arranged so that wormwheels can be automatically hobbled from the solid without previously gashing the teeth. The cutter spindle is geared in unison with indexing worm and single or multiple thread hobs can be used with equal facility. The cutter slide can be locked securely in any desired position for hobbing and an automatic feed gradually feeds the hob into the blank. The cutter arbor is 3 in. in diameter and will take cutters up to a maximum diameter of 14 in. The auxiliary cutter spindle, which is furnished, is driven through hardened helical gears from the main spindle. It is pointed out that in this way it is possible to use cutters of ordinary dimensions to cut smaller gears. This is an arrangement which enables a great variety of sizes, from small pinions to the largest gears, to be handled.

A system of oil pans completely covers and guards the wormwheel and keeps the floor clean. A supply of cutting lubricant is provided for the cutters by a large oil pump. The weight of the machine is approximately 35,000 lb.

One of the foremen at Ex-Governor Foss's blower works, says the Boston American, had to lay off an argumentative Irishman, so he saved discussion by putting the discharge in writing. The next day the man was missing, but a week later the boss saw him again at his lathe. Going up to the Irishman, the boss demanded fiercely: "Didn't you get my letter?" "Yes, sur, Oi did." "Did you read it?" "Sure, sur, Oi read it inside and Oi read it outside and on the inside yez said Oi was fired and on the outside yez said, 'Return to B. F. Sturtevant & Company, HOBBS & BROS.'"

HOBBS & BROS.
Mechanical and Civil Engineers,
PITTSBURGH, PA.

NEW LINE OF BORING MILLS

The Niles Rapid Production Turning Machine with a Centralized Control

The Niles-Bement-Pond Company, 111 Broadway, New York City, has recently placed on the market a new design of boring and turning mill for use where high production with ease and convenience of manipulation on the part of the operator is required. The machines are built in four different sizes, having swings of 44½, 54, 63 and 74½ in., the second size being the one illustrated.

The machine is self-contained and there are no parts extending below the floor line. For this reason also no special foundation is required. The housings are of box-girder form, with wide faces and double webs. There are no openings in the front face of the housings, the cross-rail elevating screws being located between the housings which are securely bolted to the bed and tied together at the top by a heavy brace. The table is deep and is reinforced by ribbing. A large diameter annular bearing running in an oil bath supports the table which is driven by a coarse pitch bevel gear having a wide face. Four pairs of parallel and eight radial T-slots are cut in the upper surface of the table. The table spindle is long and of large diameter and is maintained in alignment by an upper and lower bearing, the former being bored out of the solid bed and fitted with an adjustable taper bushing to take up wear. The lower bearing is bronze bushed and there is an adjustable threaded collar on the end of the spindle to prevent lifting.

The cross-rail is of the three-track type, with a narrow guide at the bottom and the saddle traversing screw located between the guiding surfaces. This arrangement, it is emphasized, gives the best condition for guiding the saddles accurately. The cross-rail is of box-girder construction with a broad face. Great depth is provided to resist the strains of heavy cutting and the cross-rail may be clamped to the housing easily. Power adjustment is also provided.

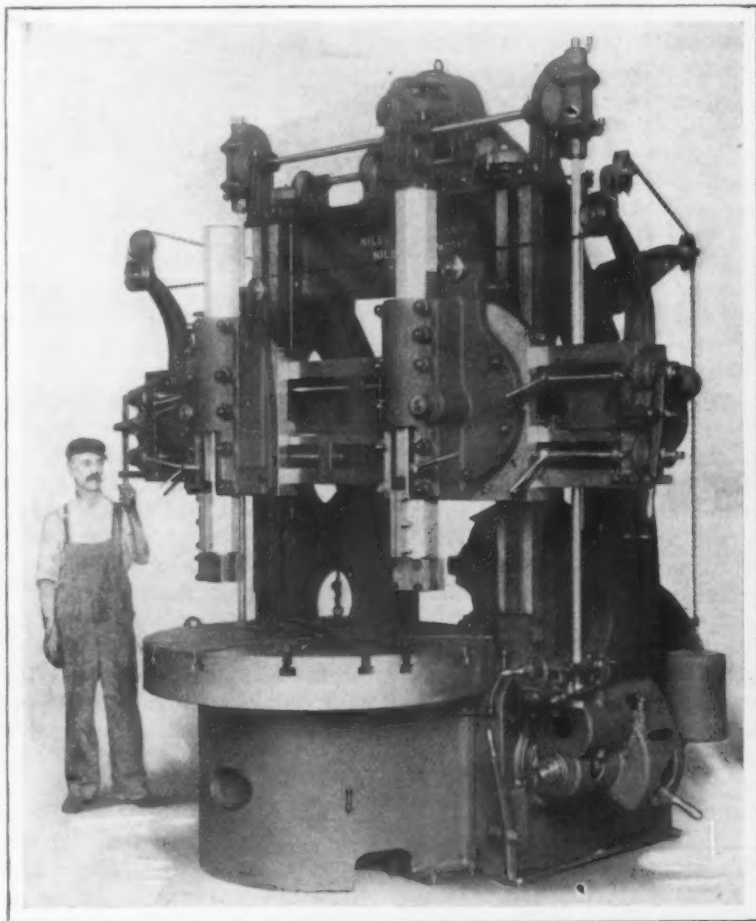
The saddles have wide bearings on the cross-rail and provision is made for taking up wear by taper gibs. For clamping each saddle when the bar is feeding, a clamp bolt is provided. The swings are accurately graduated and swiveled by an arc worm

at the top. The bars are massive steel forgings of octagonal cross-section, with a scraped bearing on four sides. This construction, it is emphasized, permits the wear to be taken up in all directions. Continuous caps are provided for the bars and there is a binder bolt in the bottom for locking the bar when the saddle is feeding. There are eight feeds, which are positive, continuous and reversible. They are independent both in amount and direction for down, cross and angular feeding of each head. All changes of feed, both in direction and amount, rapid power traverse or hand adjustment of the saddles and bars, the cross-rail adjustment and table control are within easy reach of the operator's position, one lever disengaging the feed, engaging fine and coarse feed, and operating the fast power traverse to the saddle and bars in either direction. Automatic releasing ratchets located at the sides of the saddles are provided for hand

adjustment of the saddles and the bars.

Steel forgings are used for the tool holders, which have provision for readily clamping boring, turning and facing tools. The holders have straight shanks and can be easily removed if it is desired to substitute special boring bars. The counterweights for each bar are attached to the same chain, but act independently. It is emphasized that they will not pull the swings over nor interfere with the movement of the saddles. With a view to preventing interference from overhead cranes when placing work on the table or removing it the counterweight chain is placed at the rear of the bars. To guard against accidents in case the heads or bars meet with an obstruction either when feeding or when the fast power traverse is engaged, safety friction clutches are located on the vertical spline shafts.

The machine is driven by an adjustable-speed direct-current motor, having a range of 4 to 1. This is carried on a drive plate in the rear between the housings, and the power is transmitted through a double train of clutch gears, giving two mechanical speed changes, which in conjunction with the 16 speeds provided by the controller, give at least 32 table speeds. The motor is fitted with push button control and a dynamic brake for the table. A separate motor for elevating the cross-rail and providing rapid power traverse to the bars and saddle is located on the top brace. If desired the mill can be driven by a belt and single pulley or by an alternat-



One of a New Line of Boring and Turning Mills. This Machine Is Designated as the 53-In. Size and Has a Swing of 54 In.

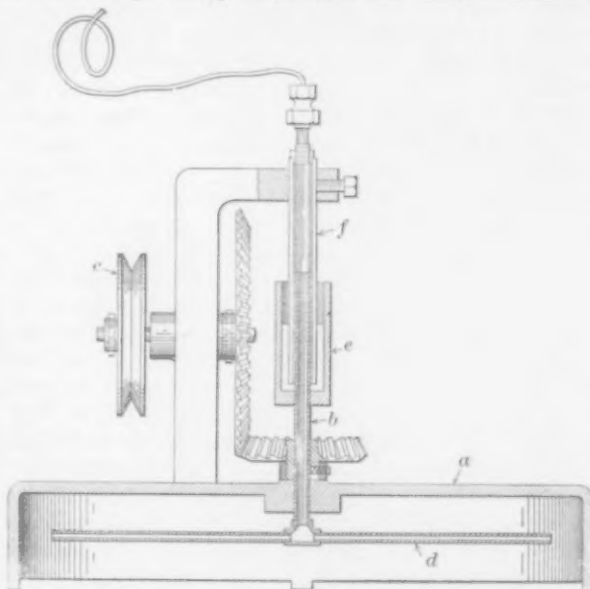
ing-current constant-speed motor, the power being transmitted through a speed box and back gear located in the rear of the mill. With this arrangement 12 speed changes are provided. The speed box has a hand-operated friction clutch for starting and stopping the table, and a brake controlled by the same lever is provided. The belt-driven machines are built on the convertible plan and can be changed to motor drive readily, if desired.

A Pneumatic Recording Tachometer

For use in connection with blast furnace blowing engines, the Bristol Company, Waterbury, Conn., has brought out a pneumatic recording tachometer. This device is intended to give a record of the rate of revolution of shafting, machinery, engines, etc., and will indicate whether the desired speed is maintained continuously and whether certain periodical stops or variations in speed, such as the slowing up of blast furnace blowing engines once every 4 hr. at casting time, are made at the proper intervals or not. Where it is not convenient to have the recording tachometer installed in self-contained form near the revolving shaft, it is possible to install the recording mechanism in any convenient position, such as on a switchboard or the wall of the engine room, a flexible connecting tube 25 ft. or longer serving to connect the revolving mechanism and the recording instrument. The pneumatic principle of operation depends on the centrifugal action of air in a revolving tube which is connected to the recorder through a special oil seal and a flexible tube.

Referring to the drawing which shows diagrammatically the construction of the revolving mechanism, there is a hollow circular protecting case, *a*, having a bearing in its upper surface for the hollow shaft *b*. This shaft can be rotated from the mechanism, the speed of which it is desired to measure, by any of the customary transmission methods, such as a set of gears, a belt connection or a chain and pair of sprockets. In the illustration and the diagram the belt and pulley method is used, one of the pulleys being shown at *c*. The transmission arrangement that is recommended by the manufacturer, however, employs a chain and sprockets. The lower

end of the hollow shaft *b* terminates in a horizontal tube, *d*, which is open at its extremities. The upper end of the hollow shaft is surrounded by a casing, *e*, which is partially filled with oil. Into this casing



A Diagrammatic View of the Revolving Mechanism

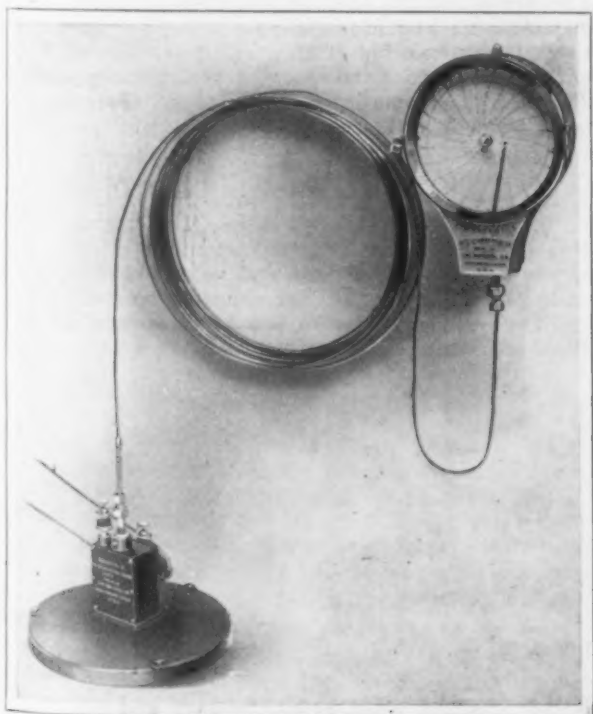
extends the free end of another tube, *f*, which is stationary and is joined at its outer end to a flexible capillary tube leading to the recording instrument. This tube is of flexible copper, and its length, of course, depends on whether the recording instrument is installed adjacent to or at some distance from the shaft or engine, the speed of which is to be recorded. The recording mechanism used in connection with this tachometer is one of the manufacturer's special low range recording vacuum gauges.

Railroad Supply Exhibit

The exhibit of railroad supplies held in the Coliseum and First Regiment Armory, Chicago, March 16 to 20, under the direction of the National Railway Appliance Association and during the week of the meetings of the American Railway Engineering Association represented a greater outlay of time and money in preparation than any previous one. Despite the extreme lack of buying of railroad supplies, the efforts of the exhibitors appear to have been rewarded by the largest interest and attendance thus far displayed. Inspired by the Safety First movement, a large number of new signal and warning devices have been perfected, and working models of this class of equipment featured the exhibit. It is also apparent that much attention has been given the past year to the problem of rail joints and rail creeping, with the result that a number of new types of fastenings were shown. The use of alloy steels in bolts for rail joints and in frogs, switches and crossings was emphasized in several of the exhibits. This exhibition also afforded evidence of another field in which uses for reinforcing steel wire and bars are rapidly increasing. Bridges, stations, coaling stations and fencing built of reinforced concrete are rapidly becoming a common form of construction.

At the annual meeting of the National Railway Appliance Association, the following officers were elected for the ensuing year: President, Norman M. Hench, Carnegie Steel Company; vice-president, Philip W. Moore, P. & M. Company; treasurer, C. W. Kelly, Kelly-Derby Company; secretary, Bruce V. Crandall. John N. Reynolds, retiring as treasurer after a service of 12 years in that office, was presented with a loving cup in behalf of the association.

The Trumbull Steel Company, Warren, Ohio, will erect another building, 75 x 600 ft., and extend its present buildings to provide room for additional mill equipment.



A Recently Developed Recording Tachometer of the Pneumatic Type

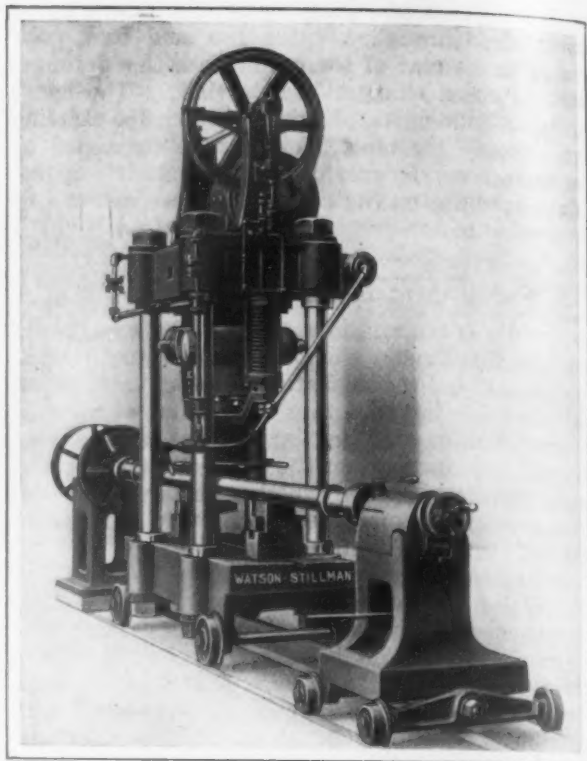
Hydraulic Shaft Straightening Machine

The Watson-Stillman Company, 190 Fulton street, New York City, has brought out a large portable hydraulic shaft straightening press. One of these machines was recently sent to Brazil for use in a shipbuilding plant to straighten propeller shafts. It is designed for use in railroad and machine shops where shafting has to be straightened. The capacity of the machine is 325 tons and is sufficient for taking the bends out of steel shafting up to 10 in. in diameter, the length being limited only by the extent of the foundation provided.

As will be noticed from the accompanying engraving, the machine is a motor-driven, self-contained unit requiring no outside air or hydraulic power. It consists of three independent parts, the headstock which is stationary, the press and the tailstock, both of which are mounted on rollers to enable them to be adjusted to varying lengths of shafts. The bed rails are flush with the floor, so that when not in use the movable parts can be rolled to one side, thus leaving the floor free of obstructions. The head and tailstocks are similar to those of a lathe, except that the centers are hinged to follow the movement of the ends of the shafts when the bend is made. The shaft is revolved from the headstock and the "high point" marked. The press is then moved to this point and the bending blocks adjusted.

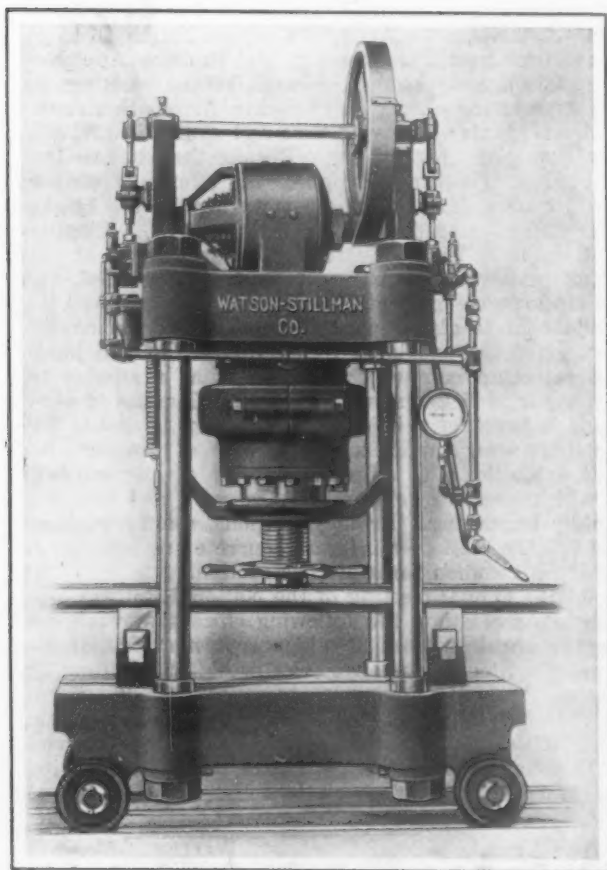
The ram has a maximum movement of 2 in., the return being effected by springs. Screwed concentrically into the ram is a square threaded adjustment screw that is shown in the front view and compensates for the different diameters of the shafts and enables the operator to predetermine the flexure desired. This arrangement, it is emphasized, eliminates all danger of overbending.

The entire hydraulic power plant, including a



A Motor-Driven Self-Contained Hydraulic Shaft Straightening Machine

5-hp. electric motor, the pump, reservoir, etc., is mounted on the top platen of the press. The floor space required is 3½ ft. from front to back, while the length is determined by the longitudinal dimension of the shaft, the head and tailstocks requiring 6 ft. in addition. The net weight of the press complete is 19,300 lb.



A Front View of the Press Showing the Mechanism for Adjusting the Ram

Engine-Type Commutating-Pole Generators

A new line of engine-driven, commutating-pole, direct-current generators, which are built in standard sizes from 25 to 400 kw. inclusive, has recently been placed on the market by the General Electric Company. The machines are built in both the two and three wire types to deliver either 115 or 230 volts. The speeds of these generators are in conformity with modern engine practice and were selected after a careful consideration of the recommendations and requirements of leading engine builders. The frame is designed for installing on the engine bedplate or masonry foundations, and the armature is bored for mounting on the engine shaft. The use of commutating poles and a special type of revolving compensator for use with three-wire machines are special features of the new design. The compensating poles are relied upon to permit operation over an extremely wide range of load and voltage with a fixed brush position and sparkless commutation, while the revolving compensator with one collector ring for obtaining the neutral connection with three-wire operation is somewhat of a radical departure from previous designs and supersedes the separate stationary compensator and two collector ring arrangement. The revolving compensator consists of a circular magnetic core upon which are mounted suitable exciting coils, the core with its coils being assembled on a cast bracket bolted directly to the rear end of the armature spider. The construction of the machine embodies all the refinements in the electrical and mechanical design of this class of apparatus.

The Metallic Packing Company, Elyria, Ohio, has been reincorporated with a capital stock of \$200,000 and its name changed to Martell Packing Company. The company has outgrown its present quarters and will probably build a new plant.

Machinery Palace at San Francisco



Partner to Genius of Machinery



The Brazier

Building Now Ready for Installation of Exhibits

The Palace of Machinery of the Panama-Pacific International Exposition at San Francisco is at this writing ready for the installation of exhibits; in fact, the first exhibit is scheduled to go in April 1. The building, which was described in *The Iron Age* of January 15, is the first of the main structures of the exposition to be completed and is the largest ever constructed entirely of wood. The description mentioned served to indicate the colossal proportions of the building, while the illustrations herewith help in giving an idea of the exterior. Practically all of the statuary on the Palace of Machinery has been executed by Haig Patigian, and some of the work is already in place. The first installment includes a pair of spandrels for the principal entrances to the Palace. These are bas-reliefs, each 7 ft. wide by 10 ft. high, with the figure of a powerful, muscular man, of strong visage, engaged in some task with machines or implements of industry and surrounded with such tools and mechanical devices as the drill, anvil, gearing, differential pulley or hammer.

There is to be statuary for the portal columns at the entrances. At the base of each of these, of which there will be four columns at each entrance, are to be four male figures, standing 7 ft. tall, and like those on the spandrels, symbolizing power and force. Surmounting each of the four columns at the entrances will be a gigantic figure 16 ft. tall. These are to represent, respectively, "Imagination," "Invention," "Electric Power" and "Steam Power."



The Smith



Genius of Machinery





Pacific Entrance to the Panama Canal. The Foundry at Balboa

The Balboa Foundry for the Panama Canal

Gray Iron, Steel and Brass Castings for Repairs
to Locks, Dredges, Locomotives and Pumps
—Oil Burning Ovens and Annealing Furnace

—BY JAMES H. KNAPP—

The average reader when thinking of the Panama canal thinks of enormous locks, a huge artificial lake and a deep cut. These are all there,



Foundry and Pattern Storage Buildings; Lumber Storage and Car Shops in the Rear; Beyond Work on Caissons for Docks

in fact they are what make the Big Ditch, but there is also besides these wonderful pieces of engineering a large and complete shops being installed as a permanent part of the canal work. These shops are generally overlooked by the average tourist, as he is not interested in seeing foundries, machine shops, pattern shops or other shops which can be seen at any time in the States.

However at Balboa (La Boca) which is on the Pacific side of the isthmus and situated at the Pacific entrance of the canal, there is a complete plant for doing a general class of repair work for canal equipment, locomotive and car work and for steamship and naval repairs of all kinds.

As a boat enters the canal from the Pacific it passes first the islands of Flamenco, Perico and Naos, which are the location of the fortifications, sails along under the wing of the long breakwater which extends from the mainland to Naos island and enters the canal proper. It comes immediately to the location of the old Balboa docks, and what is now the site of the present shops and enormous docks and coal handling plant of the Isthmian Canal Commission. Right close to these docks we find many shop buildings, which are grouped about the drydocks in the most convenient manner for quick handling of repairs.

There are two drydocks, one 1000 ft. long and the other a smaller one, 300 ft. long. The boiler, forge, machine and shipways shops are located in a line along the face of the largest drydock and the craneways are so arranged that material can be easily carried between the docks and the various shops. At the time of my visit the shops were all in various stages of construction. The structural work of all of them was practically completed and the foundations of the majority of the machines were being placed and a few of the machines were already installed.



The Shops at Balboa. The Foundry Building is in Front of the Little Patch of Smoke. Work



Be Seen to the Right of the Hill Near the Center

The planing mill, pattern shop and foundry, however, were working full blast, the foundry being the first shop to be put in operation. The foundry is equipped to make both gray iron and steel castings up to a maximum size of about 6 tons. Most of the equipment of this foundry is that used in the old shops at Gorgona. At Gorgona the commission erected complete repair shops which it knew would have to be dismantled as soon as the water in the lake began to rise. This location, however, was chosen because of its nearness to the end of the cut. The equipment used therein demanded the most of the repair work at that time.

Some idea of the construction of the new foundry can be gained from the photographs. The building proper is 316 ft. long and 119 ft. wide and is of skeleton steel frame work construction roofed over with reinforced concrete tile. It is divided into a main molding floor the full length of the building and 61 ft. wide. This floor is served by two electric traveling cranes, one a Niles of 25 tons and the other a Cleveland crane of 25 tons. On each side of this main floor are two bays each 28 ft. wide. The southwest bay contains the melting equipment, mold oven, annealing furnace, sand bins and the office, while the other bay contains the brass foundry, core room and cleaning and shipping departments.

The equipment of this foundry is very complete and consists on the molding floor of two Tabor roll-over jarring machines large enough to take a flask about 2 x 4 ft., and one small squeezer large enough to take a flask about 12 in. square. There are two molding pits and there is approximately 11,000 sq. ft. of floor space available for molding and casting.

The core room occupied the space in the four bays in front of the core ovens, and one of the pictures is a view looking down this room showing the three small core ovens at the left. The core ovens were furnished by Tate-

Jones & Co., Inc., and are new furnaces, the material for them being shipped from Pittsburgh, Pa., and erected by the commission.

There is one large core oven, 8 ft. wide by 10 ft. deep and 8 ft. high, which is fitted with three sets of hinged shelves on each side wall and is equipped with two cars to handle heavy cores. Besides the large oven there are three small ovens. Each has six swinging shelves, each capable of holding cores up to 6 in. in height, and one swinging shelf capable of holding cores up to 12 in. in height. Facing the three-rack type of ovens is a



Looking Down the Main Aisle of the Shop, Showing Mold Oven, Annealing Furnace, Cupolas and Converter to the Left

steel-frame core-storage rack, and this rack is equipped with electric heating coils in order to keep the cores dry. It is very damp in this climate, and in the rainy season especially the cores after they are dried must be kept in a very dry place. The plan on page 780 locates the core racks.

For drying molds for the steel castings there



Loading Docks Can be seen to the Left. The Drydocks Lie Behind the Buildings to the Right

is an oven which is also of the Tate-Jones manufacture, 16 ft. by 24 ft. deep and 10 ft. high, and this oven is equipped with two cars which run into the heating chamber on tracks side by side. Both the large core oven and the mold oven are equipped with Kinnear steel rolling doors. These ovens are all oil fired, and the combustion of the fuel takes place in flues running underneath the ovens entering the ovens through a series of ports in the floor. For core making, a sharp gray sand is used coming from a point a few miles up the Pacific Coast.

The melting equipment, which was all moved over from the old shop, consists of a Whiting cupola about 36 in. in inside diameter and one smaller cupola which is used for melting iron and scrap for the converter. The steel is made in a Tropenas converter of about 2 tons capacity and when a large casting is to be made metal has to be held in a large ladle for a couple of blows. The majority of the pig used comes from the States and also the coke. Considerable scrap is available on the isthmus and some is purchased in the States.

The annealing furnace, which was also supplied by Tate-Jones & Co., is to be used for annealing steel forgings as well as castings. It is 12 ft. wide, 16 ft. long and 5 ft. high in the clear and is capable of annealing a total weight of 15 tons of steel castings or a single steel casting of about 6 tons. The furnace is equipped with a heavy steel frame car which is lined with fire brick and then covered with cast-iron plates. These plates as can be seen from the accompanying photograph, have an overhanging lip which fits into a corresponding recess inside the furnace. When this recess is filled with sand and the car is drawn into the furnace, the arrangement makes a seal and prevents the heat escaping



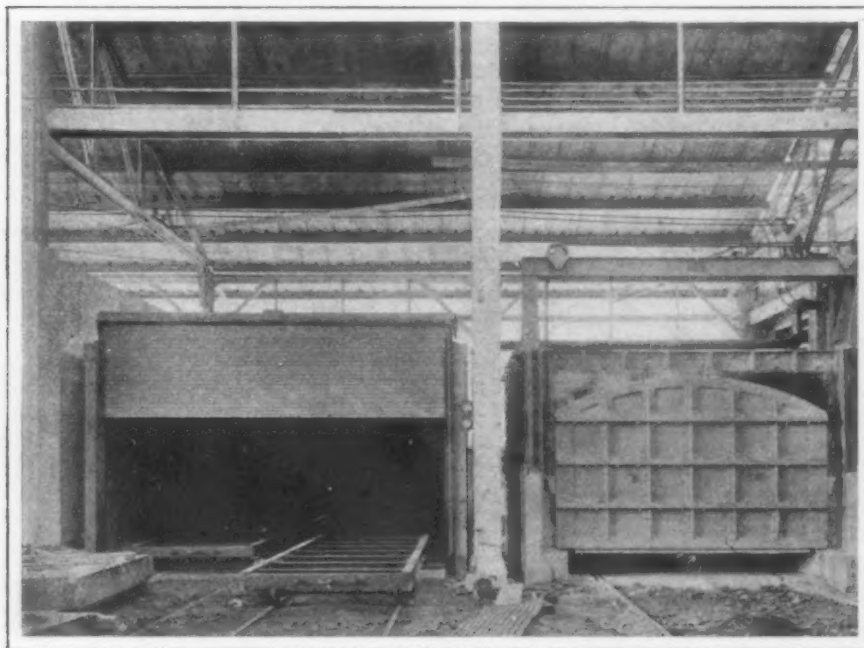
Small Core Ovens to Left with Brass Foundry in Distance

from the heating chamber down under the car.

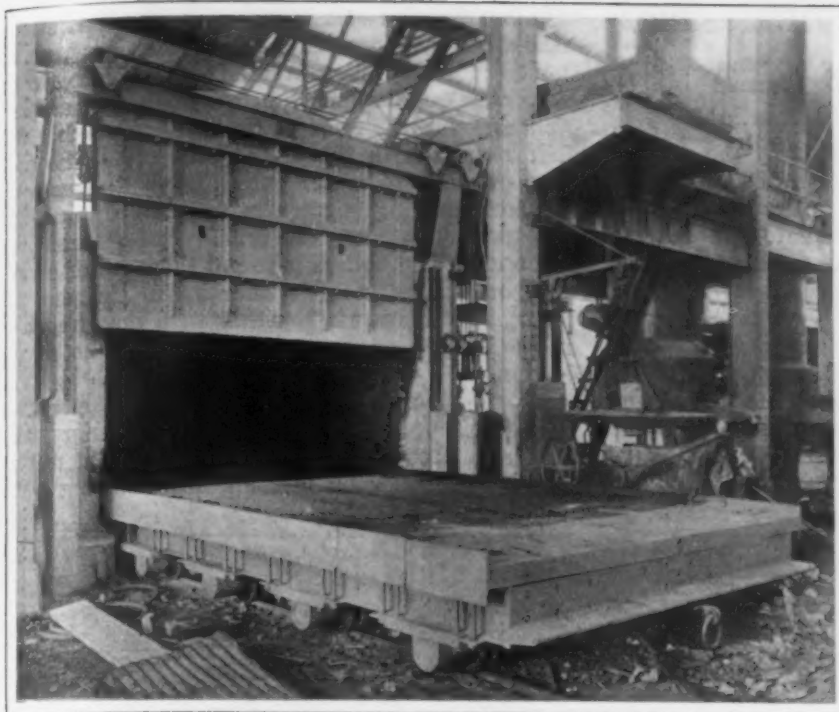
The firing of this furnace is rather unique for this type of furnace. The combustion chamber is situated along one side of the heating chamber and the oil burners are fired directly into this chamber. The flame strikes a baffle wall and by it is deflected and thrown against the arch. The heat is then drawn down across the top of the car and escapes through vents in the wall underneath the combustion chamber. These vents all open into the main flue and through this flue the gases pass the air blast supply pipe. By this means the air blast for combustion is preheated and a saving in heat obtained. The heating of the chamber is uniform throughout and absolute control of the temperature is obtained by adjusting the burners. The door of the furnace is made of sectional cast-iron plates lined with fire brick. It is raised and lowered by means of air hoists connected as shown. The furnace will be equipped with a recording pyrometer, the recording instrument being placed in the foreman's office in the corner of the building.

In the opposite corner from the office is the brass foundry and there they have three Monarch tilting brass melting furnaces. Metal is handled from these furnaces by means of a small air hoist jib crane.

In the cleaning room is installed one large cold saw and one small cold saw, also two large and two small tumbling barrels and two wheeled grinders. At the end of the cleaning room is a sand blast apparatus and at this end of the bay the finished castings are loaded on cars run in on the spur. The cleaning room and shipping floor is served by an electric traveling crane which was in use at the old



Mold Oven and the Annealing Furnace



Annealing Furnace Car Drawn Out

shop and which was cut down to fit the smaller runways of this place.

At the south end of the foundry, the crane runways extend outside 105 ft., giving an available storage space for large flasks of 61 ft. x 105 ft. Beyond this flask storage yard is the pattern storage building. This building is of reinforced concrete construction throughout and as can be seen from one of the illustrations is liberally supplied with windows. This hardly seems in accord with modern ideas and practice in the construction of a pattern storage vault; although of undoubted fire-proof construction, it would be easily possible, because of the number of windows, for a fire to destroy all the patterns, leaving the building practically unharmed.

The foundry at the time of my visit was crowded with work, consisting of gray iron work for the locks. There was also considerable repair work, both iron and steel, including propellers for dredges and tugs, repair parts for steam shovels and locomotives, large blades for the pumps on the big suction dredges and numerous miscellaneous repair parts.

There were employed at that time about 30 molders, all American, and about 50 or 60 helpers, the majority of the latter being negroes from Jamaica and Barbadoes. The working day is from 7 to 11 a. m. and from 1 to 5 p. m., giving the men 2 hr. at noon, the hottest part of the day. The same master builder who made the big ditch possible has complete charge of these big shops and through his various department heads controls them. Colonel Goethals is a familiar figure to one who has been on the Zone for any length of time, as he can be seen inspecting the various

phases of the work most any day and his little special car is kept busy traveling about from place to place. He is respected and liked by every man on the job, for they know that any grievance, no matter how small, or who is concerned, can be taken to the "old man" and a fair deal received.

Spraying Molten Metals

The Schoop process for coating objects with various metals by directing a fine spray of the molten metal against them has been improved recently by the introduction of new apparatus. This new device is described in an article in the *Revue de Metallurgie*, Paris, France, December, 1913. The machine is called a pistol-syringe. The metal in the form of wire is fed automatically into it, and melted by means of an oxy-hydrogen flame, or a flame where the hydrogen is replaced with illuminating gas. The molten metal is sprayed with compressed air which also works a small turbine that advances the wire. The use of metallic powder is therefore obviated. The details of the construction are given, and several views of it in use. The most diverse metals can be used—lead, tin, zinc, aluminum, copper, brass, etc. The inventor also anticipates a successful use of glass and enamel. Very thin coatings can be produced for purely decorative purposes, or thicker ones that can be polished by ordinary methods, and if desired removable coatings several millimeters thick for reproducing medals, plates for engraving, etc. All kinds of objects can be metallized, and this very interesting process is well worthy of careful attention.

The Van Dorn Electric Tool Company, Cleveland, Ohio, has opened a sales office at 1013 Mutual Life Building, Buffalo, with A. J. Borget as district sales manager. His territory will cover the New York district west of Rochester. An error was made in *The Iron Age* of March 12 in locating Mr. Borget's office in New York City.



Large Core Oven, Showing Side of Small Ovens

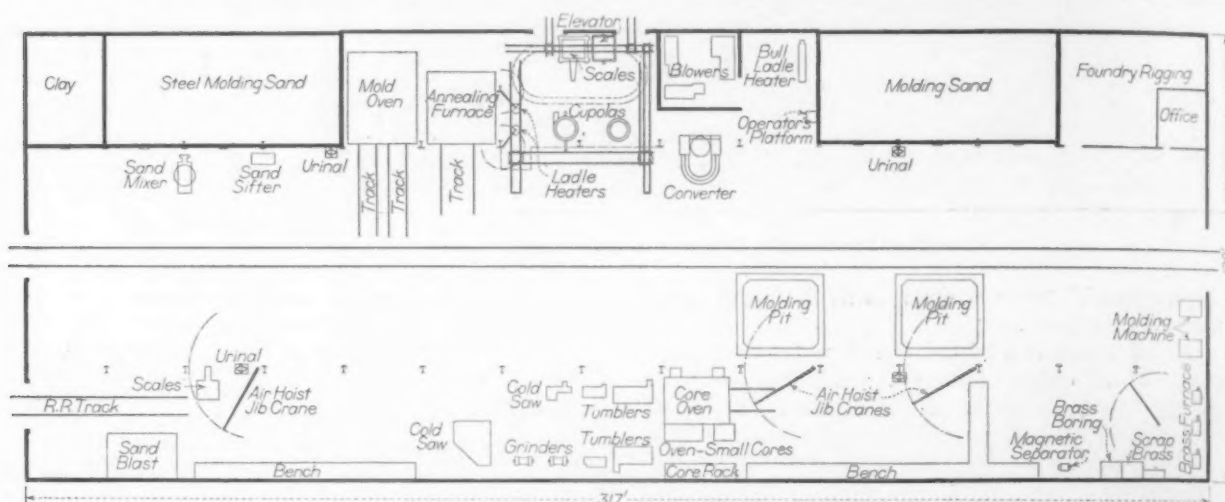
HARD WATER FOR BOILER FEED*

A Discussion of the Losses Caused by Its Use—Effects of Scale Formation

Probably the greatest loss caused by the average hard water is due to the formation of scale on the heating surfaces of the boiler. Scale, being a non-conductor of heat, tends to insulate the heating surfaces of the boiler from the water within, so that to evaporate the same amount of water a greater amount of fuel must be used when the surfaces are scaled than when they are clean. As the amount of this loss depends directly upon the thickness and composition of the scale, the amount of heating surface covered, the type of boiler and the operating conditions, it is impossible to state definitely what the loss would be in any individual case.

While stokers of other apparatus are sometimes installed to overcome this loss in efficiency, at the same time they have a tendency to decrease the percentage of efficiency, as the additional evaporation causes more scale to be deposited with a further reduction in the actual efficiency. The presence of scale in water tube boilers decreases the available heating surface by building up upon the tube and decreasing the area. The general practice with scaled boilers is to put them out of service and remove the scale by mechanical cleaners, and the cost of this work, together with the investment on the tools used, must also be taken into consideration.

Foaming and priming of boilers is often caused by the presence of certain scale-forming ingredients in combination with organic or suspended matter. A foaming boiler by mechanically carrying water



Plan of the Balboa Foundry, Panama Canal

There have been a great many purely scientific experiments made, the results of which demonstrate thoroughly that an excess amount of fuel is necessary to produce results on scaled boilers. In one case of a locomotive where the heating surfaces were covered with scale ranging from $1/32$ to $3/64$ in. in thickness, it was found that the locomotive would evaporate 12.6 per cent. more water after cleaning than when the tubes were scaled, the net increase in fuel consumption in this boiler being 9.55 per cent. Another series of tests on scaled boiler tubes taken from different boilers showed that the amount of fuel required to drive the same amount of heat through the tubes varied from 5.96 to 15.75 per cent., depending upon the thickness of scale. The average fuel loss in boilers using hard water is anywhere from 10 to 50 per cent., and this occurs not only in the boilers, but in inclosed heaters and economizers as well. In addition to the cost of this waste fuel the cost of handling the coal and the ashes resulting from it must also be considered.

DECREASE IN EFFICIENCY CAUSED BY SCALE

In a number of cases the loss of fuel is not as important as the loss of efficiency. The insulating properties of the scale lower the efficiency of the boilers, as it is impossible to force as much heat through a scaled tube or sheet as through a clean one. This lowering of efficiency frequently reduces the actual capacity below the demand, so that additional equipment is required to carry the load. If this has to be installed there is another charge which must be placed directly against the effect of hard water.

*From a paper by K. W. Bartlett, inventor of the Bartlett-Graver water softener, East Chicago, Ind.

from the boiler greatly decreases the steaming capacity, and in addition there is the danger of getting water into the engine cylinders, which tends to reduce the effect of lubrication and cut both the cylinder and the pistons.

FUEL REQUIRED TO RECOMMISSION A BOILER

After a boiler is cleaned, the amount of fuel required to place it in service is directly chargeable against scale, as the boiler was in operating condition at service pressure when it was taken off for cleaning. The amount of coal required to accomplish this is approximately 2000 lb. per 100 boiler hp., and its cost can be estimated directly by the number of B.t.u. which are required to raise the temperature of the water in the boiler from 200 deg. F. to 338 deg., which corresponds to a gauge pressure of 100 lb. As a 100-hp. boiler holds approximately 190 cu. ft. of water, it will require 12,065,000 B.t.u. to put the boiler into service at 100-lb. pressure, which will theoretically require 1150 lb. of coal, containing 10,500 B.t.u. per lb., or 1533 lb. if 75 per cent. boiler efficiency is maintained. As a matter of fact, the amount of coal required will be approximately 2000 lb. to take care of the amount of heat absorbed by the furnace and the masonry work.

BOILER ACCIDENTS AS A RESULT OF SCALE

Scale and corrosion are responsible for a large number of boiler repairs, many of which are caused by burnt or ruptured sheets or tubes that have become overheated through the insulating effect of scale. Out of a total of 136,682 boilers inspected in 1909 by the Hartford Steam Boiler Inspection and Insurance Company, 8165 were reported as defective

through burnt or fractured plates, 18,607 defective through leaky seams and tubes, and 17,274 defective through internal corrosion. In addition, 106,141 boilers were reported as defective and 6755 as dangerous, through reasons directly traceable to the presence of scale or corrosion.

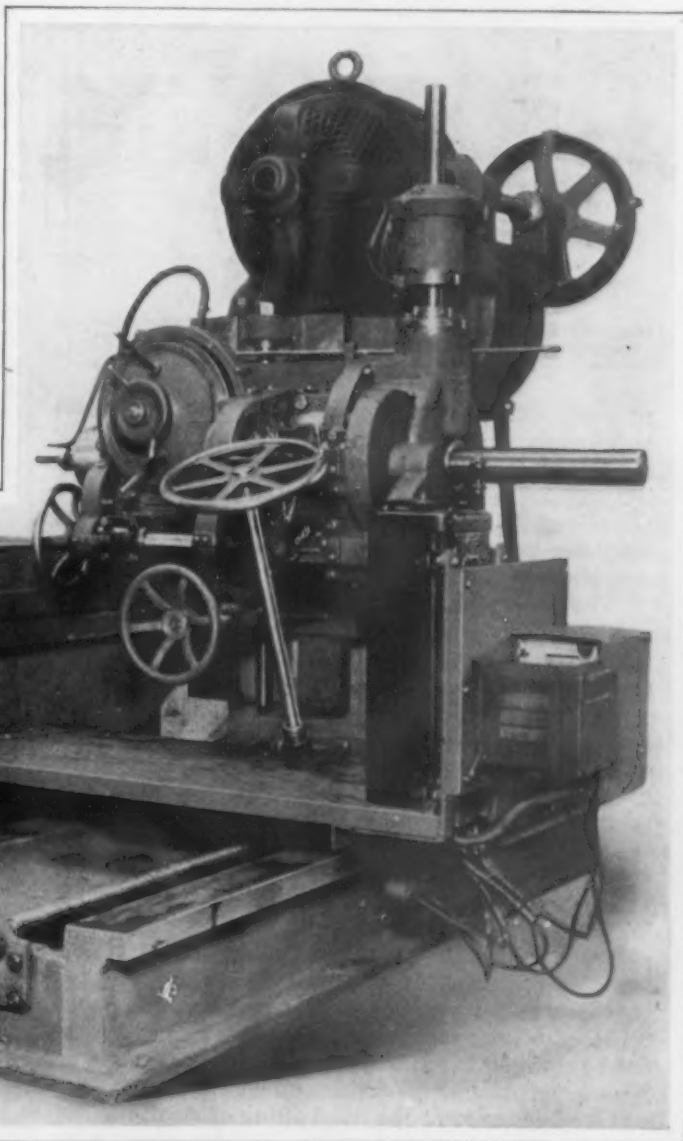
Heavy Duty Horizontal Drilling Machine

For heavy drilling with high speed drills in hard material, the Detrick & Harvey Machine Company, Baltimore, Md., has brought out a horizontal drilling machine. The general design is similar to that of a horizontal boring and drilling machine of the traversing column type. The work table, which is of the high box type, is fixed in position and permits the spindle to be brought down within 3 in. of it. The column has a horizontal traverse of 6 ft. on the runway and has a saddle having a vertical adjustment of 12 in. mounted upon it.

The spindle is of high carbon hammered steel, with a tapered front bushing, $7\frac{7}{8}$ in. in diameter, running in a phosphor bronze bushing. The main body of the spindle is 4 in. in diameter. Adjustment is provided for taking up wear and there is a dust-proof roller thrust bearing which is provided with a standard taper socket hole. A 20-hp. adjustable-speed motor, having a range of 4 to 1, is mounted on the top of the column and drives the spindle at

on the runway. Both the saddle and the column can be adjusted to any required position and gibs are provided for taking up wear. The amount of adjustment of the spindle, saddle and column can be varied if desired. The controller for the driving motor is also mounted on the operator's platform, an arrangement which enables all the movements to be controlled from a single point.

An oil jet is provided for the drill, the supply being furnished by a rotary pump which is driven by a small auxiliary motor. A gutter extends around all four sides of the table and provides a means for returning the oil to the supply tank of the pump and eliminating waste.



A Motor-Driven Horizontal Drilling Machine Designed for Heavy Duty in Connection with Hard Material and High Speed Drills

speeds ranging from 60 to 240 r.p.m. All the driving gears are of cast steel or manganese bronze and the pinions are of high carbon steel, no belts or chains being employed in the driving or feeding mechanism. The power feed is driven from the spindle sleeve gear and has all-steel gears and clutches, with a steel pinion meshing in a rack that is cut from the solid steel of the feed quill. Four changes ranging from 0.004 to 0.09 in. per revolution of the spindle are provided.

The vertical movement of the saddle on the column and the horizontal movement of the column on the runway are obtained through handwheels which are conveniently located at the operator's platform. The column is mounted on a roller, this arrangement being relied upon to reduce friction

Announcement is made of the purchase by the Dodge Mfg. Company, Mishawaka, Ind., of all the gear patterns, gear machinery and powder machinery patterns of the I. & E. Greenwald Company, Cincinnati, together with all records and drawings and the good will of the business. The addition of the gear patterns to the already extensive list of Dodge gears gives the company one of the most complete lines of gears in the United States.

The Acklin Stamping Company, Toledo, Ohio, a few days ago entered order number 1000. As this company began business only $2\frac{1}{2}$ years ago, and many orders for stampings are for 500,000 to 2,000,000 pieces, it can be imagined that the business represented by the 1000 orders is a record bringing much pride to the management.

Some Interesting Tests of Filtered Oil

To determine exactly what deterioration lubricating oil suffers when in constant use, the Richardson-Phenix Company, Milwaukee, Wis., recently had a rather elaborate series of tests made on different samples of oil at the laboratories of Cornell University. It was proved by these tests that if oil is

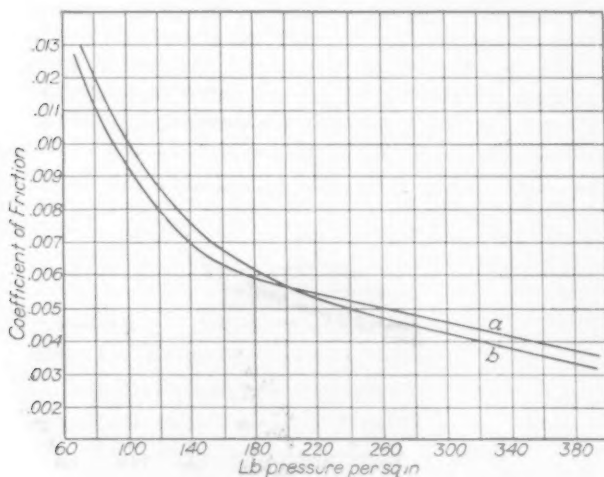


Diagram Showing Results of Tests Made to Determine the Coefficient of Friction of New Lubricating Oil and the Same Oil After It Had Been Used

properly filtered it can be used over and over again indefinitely without losing any of its lubricating qualities. The samples were selected from a number of plants, and the data secured from the test of the oil used at the Hotel McAlpin, New York City, has been selected as representing the most severe operating conditions.

The power plant of this hotel is equipped with a Richardson central oiling and filtering system, supplying lubrication to four engines, four air compressors and a crank and flywheel pump with a grand total of 134 points of lubrication. The plant operates continuously, and the average temperature of the engine room is 100 deg. F. On account of the great variety of machines lubricated, the high load factor and the exceptional temperature conditions, the work imposed on this lubricating system is probably as severe as can be found in any power plant. The average amount of oil handled by the lubricating system was 150 gal. per hr., or about 1800 bbl. per month. Although this large amount of oil is supplied continuously to the bearings, it is stated that it is only necessary, in this plant, to add about 3 bbl. of oil per month, and even this quantity cannot be charged to natural shrinkage in the system as large quantities of oil are drawn off from the filters and used in cans for the hand oiling of small pumps, valve gears and other bearings not connected with the oiling system.

To determine the changes undergone by the oil, a sample of the new oil, as received in barrels from the manufacturers, was secured, and a sample of oil was also drawn off from the clean oil compartment of the filter. These were sealed in the engine room and shipped to the testing department of the university, where a series of tests were made without any further purification or filtration. A number of friction tests were made on a railroad lubricant tester, having a hardened steel journal and bronze bearings with a total area of 20 sq. in. In all the tests, the testing machine was run at a constant speed of approximately 360 r.p.m., and the load applied in increments of 75 lb. per sq. in., until a total pressure of 1500 lb. was reached. The test at each load was continued until the friction and tem-

perature of the bearing was constant. The oil was fed upon the side of the bearing through a sight feed oiler, and the feed maintained as nearly constant as possible throughout the tests. The results of the tests for the coefficient of friction are presented in the accompanying diagram, the new oil being shown in the curve *a*, while the filtered oil is represented by the curve *b*.

Tests were also made to determine what physical changes, if any, had taken place in the oil, which had been used in the system for over 18 months. It was found that the oil had gained in specific gravity through constant use, which was to be expected, as the oil in passing through the bearings had had some of its more volatile constituents driven off. The tests for viscosity showed that the used oil had a higher value than the new, thus demonstrating that as the oil is used over and over again in the oiling system it actually gains in body, provided, of course, that the entrained water is entirely removed by the filter. It will be noticed that the new oil has a slightly lower coefficient of friction on low bearing pressures, while the purified oil shows a lower value on higher ones. This is due to the fact that the old oil has more body and is thus better able to maintain a lubricating film when subjected to higher pressures. The difference between the two curves, however, is so slight that for all practical purposes, properly filtered oil is as good a lubricant as new. A set of curves to show the difference between the temperature of the bearing and the room, were practically superimposed, and in no case was the variation more than a few degrees.

The Dr. Von Bauer Coke Ovens

A pamphlet has been issued describing the Dr. Von Bauer by-product coke ovens which are represented in the United States and Canada by the Von Bauer-Lively Coal Products Company, Singer Building, New York. The Von Bauer oven has been improved in a number of respects since it was described in *The Iron Age* of February 27, 1908. Various installations are referred to in the pamphlet, including those at the Friedrich Krupp mines at Hanover, the Schneider Works at Le Creusot, Ilseder Huette, Carlton Iron Works, and the Nova Scotia Steel & Iron Company's plant at Sydney, Nova Scotia.

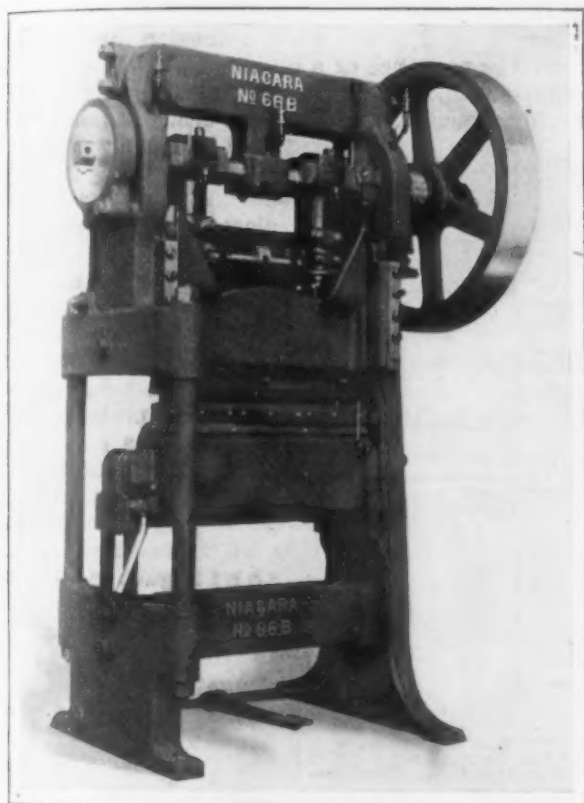
Among the features of the Dr. Von Bauer ovens are mentioned the introduction of steam to obtain a higher yield of gas, ammonia and tar, the coking of non-fusing or expanding coal, the small dimensions of the chimney and the heating flues in the coke oven, and the application of the heat in such a manner that "the coal at all levels of the charge from the roof of the oven to the bottom is in the same state of carbonization during the entire coking period." The heat is so applied that "the entire coal charge is subjected to a uniform heat and not the oven walls. The oven walls are heated with an increase in intensity in the direction from top to bottom in accordance with the increased density or weight of the coal." Views are given of the plant of the Nova Scotia Steel & Iron Company at Sydney, and of several others, including that at Servola, Trieste, Austria, where lignite and bituminous coal are carbonized. The gross returns of by-products per ton of coal are figured at \$5.11, the cost of coal containing 70 per cent. carbon and 30 per cent. volatile being put down at \$2.50 a ton.

The status and tendency of the gas industry is to be discussed by Walter R. Addicks at a meeting of the Society of Chemical Industry, to be held Friday evening, March 27, at 50 East Forty-first street, New York City. A paper is also to be presented by A. E. Forstall on "Recent Improvements in Gas Manufacture."

Side Seaming Machine for Metal Barrels

A recent product of the Niagara Machine & Tool Works, Buffalo, N. Y., is a side seaming machine which is intended to form the long seam on sheet metal bodies that are used in the manufacture of oil and asphalt barrels, ash and waste cans and other work of a similar nature. It is emphasized that with this machine there is no preliminary work required, aside from forming the body, as the lock seam, which is of the customary shape, is formed by two consecutive strokes of the machine. Work from 9 to 24 in. in diameter and not exceeding 36 in. in length can be handled by the machine, the heaviest metal for which it is adapted being No. 24 gauge.

The horn of the machine has a swinging support on the outer end which enables the work to be placed



A New Side Seaming Machine Intended for Forming the Long Seam on Sheet Metal Barrels and Other Work of a Similar Nature

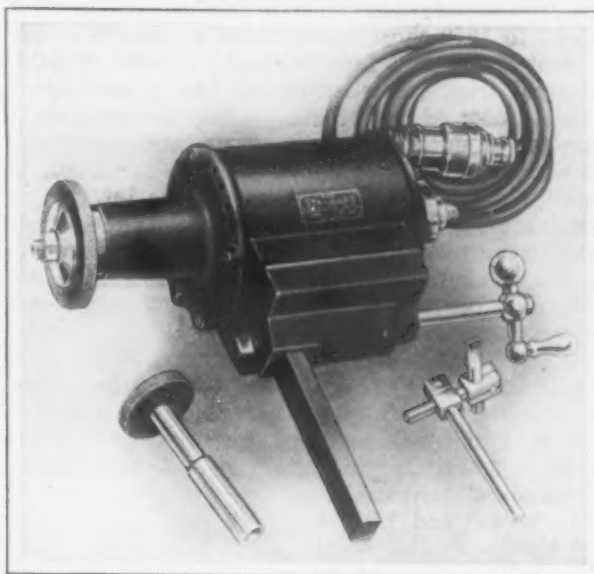
in the machine and removed when it is completed. A safety lock is provided which prevents the positive clutch controlling the motion of the machine of being tripped unless the horn support is in position.

Trade Directory of South America

A revision and detailed classification of the names of South American importers and merchants, made by the American consular officers in co-operation with the Bureau of Foreign and Domestic Commerce of the Department of Commerce, Washington, has been published as a section of a new edition of the World Trade Directory. A feature is the listing of the American and other foreign agents of South American importing firms, and of the names of the parent firms of branch houses located in various South American cities. The directory does not aim to include the names of South American exporters, nor are the names of manufacturers given, except those who are, or seem likely to become, purchasers of American materials or merchandise. The publication is for exporters and manufacturers in the United States. It is sold at \$1 a copy, obtainable on application to the Bureau of Foreign and Domestic Commerce.

Universal Electric Grinding Machine

A new line of portable electric tool post grinding machines has been developed and is being placed on the market by the Standard Electric Tool Company,



One of a New Line of Portable Electric Tool Post Grinding Machines

Cincinnati, Ohio. They are of the universal type and will operate on both direct and alternating current circuits, where the frequency of the latter does not exceed 60 cycles. The machines are manufactured in 1/6 and 1/4 hp. sizes and operate at a speed of approximately 6000 r.p.m.

On account of the rapid rate of rotation, it is pointed out that the grinding machines are especially adapted for internal work. Ball bearings, which are incased in dustproof grease packed chambers, are used. The motors are form wound, and the windings are impregnated with insulating compound, which is relied upon to prevent grounds, short-circuits, etc. They will withstand rather heavy overloads without damage and are cooled by a high power fan.

In addition to the grinding machines the company has also brought out two new sizes of universal drilling machines. These are designated as the 5/8 and 1 in. sizes, and are in addition to the others which have been illustrated in *The Iron Age*, January 9 and July 3, 1913. These will operate also on direct and alternating current circuits, and the motors are of the same type as the grinding machines. The smaller of the drilling machines is fitted with a No. 2 Morse taper socket or with a chuck, while the 1-in. size has a No. 3 Morse taper socket. These two sizes of drilling machines have also been built for direct-current use only and also for two and three phase alternating-current circuits. Both lines of machines are built on the unit plan, so that it is possible to take them apart easily, all the electrical connections being made in the frame unit.

In recognition of its Eastern business, handled at its Pittsburgh plant, the Des Moines Bridge & Iron Company has created a separate company for the filling of all contracts taken in the territory east of the Mississippi river, to be known as the Pittsburgh-Des-Moines Steel Company. The name Des Moines Bridge & Iron Company will be continued for the organization which will conduct the business in the territory west of the river. The management of the allied companies will remain unchanged.

BREAKDOWNS OF MACHINERY*

Shaft Failures Due to Disintegration of Material and Surface Cracking

The majority of mill engines have plain crankshafts with overhung cranks carried in two bearings. In 1879 these shafts, except a few old ones of cast iron and a few new ones of steel, were of wrought iron. Now nearly all are of mild steel. I think most of the breakages may be ascribed to gradual disintegration by wear and tear and vibration of spur gearing or to the extension of small flaws or cracks existing in the interior of the shaft when new or developed upon the surface afterwards by chilling it when hot. The duration of life measured in revolutions of the engine undoubtedly bears some relation to the stress, but I cannot say what this relation is.

I would like to describe a few breakages of crankshafts. The first case is one of the disintegration of a cast-iron shaft by wear and tear. It belonged to a pair of beam engines, and was put in, with them, in 1850. In 1900 there were several slight longitudinal cracks in both necks, and in the left-hand neck one 14 in. long, which was said to have been visible for 20 years. On April 7, 1910, this neck got hot, and the mill had to be stopped to allow it to cool. On April 8 it ran hot again, and was examined in the evening, when, besides the 14-in. crack, 24 other well-defined cracks of various lengths, up to 5½ in., were visible, all longitudinal in direction and situated near the middle of the bearing. It then transpired that the neck had been hot in 1908, and had been cooled with water. It was, therefore, doubtful whether the cracks were more than surface cracks caused by the water, but, having regard to the age of the shaft, its replacement was advised. The decision was justified when the shaft was broken under the tup. The fracture surfaces did not coincide with any of the longitudinal superficial cracks, but were transverse and diagonal. Some particulars of the life of the shaft, so far as they could be ascertained, may be of interest:

	1850 to 1873	1873 to 1897*	1897 to 1910
Millions of revolutions.....	70	76	41
Initial load on piston, lb.....	90,000	56,500	51,000
Bending stress on neck, lb. per sq. in..	3,650	2,270	2,050
Load on piston at cut-off, lb.....	76,500	36,800	33,960
Bending stress equivalent to bending and torsion by Rankine's formula, lb. per sq. in.....	3,750	1,930	1,580

*Mill stopped one year during this period.

Total life, 187 million revolutions. Average stress, 2700 lb. per sq. in.

Five of the six diagrams in the accompanying engraving show the gradual destruction of a wrought-iron shaft 28 years old, during the last four years of its life. The first crack, probably the opening of a cinder mark or imperfect weld in the forging, was seen in the left-hand neck in

October, 1888. The development during the following three years is shown in the drawing. In 1892 it had further extended, and there was also another crack in the right-hand neck, of the development of which I have no record. The cracks shown by the full lines are on the part of the circumference furthest from the crankpin, those shown by the dotted lines on the part nearest the crankpin. The stress in the shaft was 8500 lb. per sq. in., and the life 123,000,000 revolutions.

The diagram in the lower right corner shows the crankshaft of a pair of McNaught beam engines running at 32½ r.p.m. After the shaft had worked nine years, a very interesting crack appeared in one of the necks, as shown. For a length of 5½ in. it was absolutely straight, without the jagged edges a crack usually presents, and followed the line of a circumferential scratch, such as might have been made by a knife held against the revolving shaft. At either end it branched off diagonally for a length of 2½ in., each extension having the normal appearance of a crack. I marked it with a center-punch, and let the engine run on. It ran for four months, and then the crack began to extend so rapidly that the shaft was thought to be unsafe, and was replaced. The stress on the neck was about 7500 lb. per sq. in., and the life of the shaft only 51,500,000 revolutions.

The case of a shaft, which was probably new in 1893, was also mentioned. The neck was 13½ in. in diameter and 26 in. long. Test pieces cut from the broken shaft gave a tensile strength of 25.7 tons per sq. in., a yield point of 14.3 tons per sq. in., an elongation of 40½ per cent. in 2 in., and a contraction of area of 60.3 per cent. In 1905 the neck was free from cracks, but in 1908, when

the next examination was made, there were a number of fine marks like scratches, principally in a circumferential direction, as clean as if cut with a knife. One in particular, about 7 in. from the flywheel end of the neck, was 18 in. long. As the marks were so fine and clean, it was hoped that they were nothing more than scratches, or, at most, skin cracks brought out by heating, and as the shaft was very lightly stressed, only about 4500 lb. per sq. in., it was allowed to run on. A few days later, however, the engine had to be stopped, as black oil appeared inside the bore. The long crack was then found to have extended almost continuously round the neck, following one or other of the circumferential scratches. A piece broken off the shaft and magnified about four times clearly showed how the small surface scratches were eating into the steel. The cause of the scratches could not be ascertained.

The lecture also touched upon other phases of the subject, such as engine valves and valve gears, air pump valves, engine bedplates and cylinders, damage to boilers by the carrying over of water and the breakage of pistons and piston rods and spur gears due to vibration.

*From a lecture delivered by Michael Longridge before the Graduates' Association of the Institution of Mechanical Engineers, London, England, February 9, 1914.

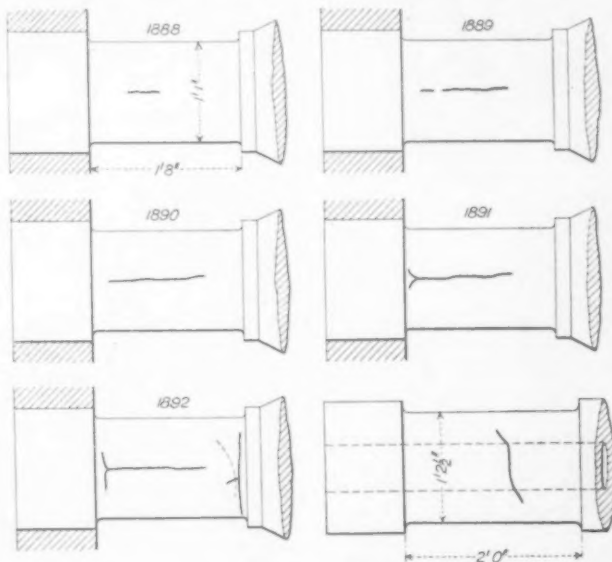


Diagram Showing the Gradual Growth of a Crack in a Wrought-Iron Shaft 28 Years Old During the Last 4 Years of Its Life and the Effect of Skin Cracks or Scratches upon Steel

A Horning Press of Rather Unusual Size

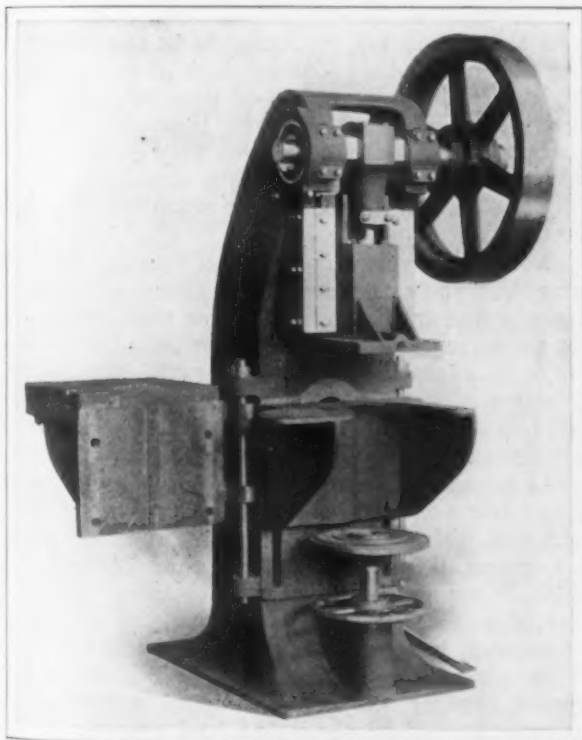
The Cleveland Machine & Mfg. Company, Cleveland, Ohio, has recently brought out a horning press of unusual size and special features. The press is adapted for blanking, forming and wiring operations and also for grooving, piercing and riveting work.

The knee is of the swinging type and can be moved to the left, as shown in the accompanying engraving, and the auxiliary or wiring table placed in the working position. The adjusting screw has a shouldered plate, which is relied upon to center and support the article to be operated on. With this arrangement the press will accommodate wiring, clinching and other dies for operations on the tops and bottoms of pails, tubs, pipe, garbage cans, etc.

The following table gives the principal dimensions and specifications of the press:

Stroke of slide, in.....	2½
Minimum distance between bed and slide, in.....	6
Maximum distance between bed and slide, in.....	18
Adjustment of knee, in.....	12
Diameter of horn hole, in.....	7¾
Distance from floor to center of horn hole, in.....	44
Maximum length of seam, in.....	20
Maximum diameter of wiring work, in.....	18
Maximum length of work handled on adjusting plate, in.....	24
Thickness of bolster plate, in.....	2½
Width of bed, in.....	27
Depth of bed, in.....	24
Distance between center of slide and back, in.....	12
Weight of flywheel, lb.....	1,100
Speed of flywheel, r.p.m.....	90
Floor space required, in.....	46 x 70
Distance from floor to top of wheel, in.....	109
Approximate weight, lb.....	9,000

With the knee swung in place against the frame the press is adapted for blanking, forming and wiring operations on a great variety of work. If



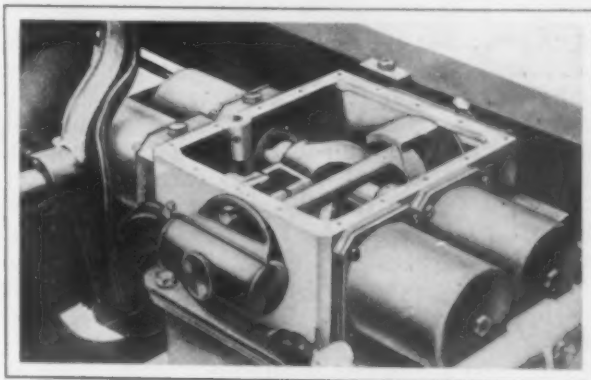
A Horning Press of Somewhat Unusual Size and Special Construction with the Standard Knee Swung to the Left and the Wiring Table Substituted

the knee is swung to the left, away from the front of the press, a horn can be employed for grooving, piercing and riveting operations.

The special topics for the October meeting of the American Institute of Mining Engineers are announced as follows: Metallurgical fuels, electric furnaces and duplex processes.

An Electric Device for Shifting Gears

For shifting the speed changing gears of gasoline automobiles, the Cutler-Hammer Mfg. Company, Milwaukee, Wis., is manufacturing an electric device. The power for shifting the gears is supplied by a solenoid capable of exerting a pull of 150 lb., instead of employing a hand-operated lever. The principal advantages claimed for this device are



An Electrically Operated Device for Shifting the Gears of a Gasoline Automobile by Solenoids

ease of operation, securing the desired speed changes rapidly, low current consumption and the impossibility of stripping the gears.

The device consists of four solenoids mounted under the car, which control the three forward and a single reverse speed, the solenoids being energized by current taken from either a small storage battery or a set of dry cells. A set of seven buttons is mounted on the hub of the steering wheel, three of which control the forward speeds, one for the reverse speed, a button for use in stopping the car, and two auxiliary ones which enable the self-starting device and electric horn to be operated from the steering wheel.

When one of the speed-changing buttons is depressed the circuit to the proper gear shifting solenoid is partly closed, but the actual closing is not completed until the clutch pedal is pushed down to the floor, a small master switch which completes the circuit to the battery being mounted on the clutch pedal. It is pointed out that very little current is used, as none is consumed except at the instant the gear shifting solenoid is energized. In actual tests it has been found that the time that the master switch is closed is less than 1/3 sec. for each gear shift.

Incandescent Lamps for Large Areas

A high candle-power incandescent lamp operating at an efficiency of approximately 0.6 watts per cp., which is 33 per cent. higher than any efficiency ever before attained in a commercial incandescent lamp for standard lighting circuits, has been brought out by the Westinghouse Lamp Company, Bloomfield, N. J. It is made in 750 and 1000-watt sizes, the former giving approximately 1100 cp. and the latter 1650 cp. The filaments in the lamp consist of a closely coiled tungsten wire supported by anchors and the light given is said to approach sunlight more closely than any other form of incandescent lamp. On account of the great brilliancy of the filament, the manufacturer recommends that the lamps be used with some kind of diffusing reflector, which adapts them for indirect or semi-direct lighting of large areas in factories and mills. The lamps are intended for operation on direct or alternating current circuits of any frequency in commercial use at the present time, where the voltage is between 100 and 130.

Steel Casting Costs and Sales

The Various Methods of Estimating— Lighter Castings Have Made Old Ways Obsolete — Danger of Class Prices

—BY W. BENTON KELLER*—

The successful operation of a steel foundry today necessitates the application of careful analysis and investigation into every detail in order that the highest efficiency in both manufacturing and selling may be permanently maintained. As the source of income is contingent upon the sale of the product, and as the chief object in manufacturing is to effect a profit, it follows that the cost of each article of production must be known, if the selling is to be conducted intelligently.

In a way, prices are governed to a great extent by supply and demand. Competition in the steel casting industry has become keener with each succeeding year's business, while the margin of profit has been steadily dwindling, until the present-day sales prices quite frequently show the margin on the wrong side of the ledger. The effect of these conditions is a depression of prices in general. When in addition the natural foundry hazard is considered, together with the imperfection of present-day practice, which is not immune to an occasional bad casting, regardless of design, it follows that without a definite knowledge of actual costs and full consideration of the uncertainties of manufacture, an intelligent selling price is out of the question and the tendency to undersell costs is an easily acquired habit.

PLANT OPERATION AND SELLING EFFICIENCY

Selling and plant operation are absolutely dependent one upon the other. The close observance of each and the efficient operation of both insure success. The most efficient shop management, however, can be nullified by poor selling, and haphazard shop operation spells failure, regardless of well ordered and intelligent sales management. With the complementary relations of these two branches of the business so manifestly defined, it follows that selling must be confined within the limits of plant operation, in order to maintain high efficiency, and it is obvious that to determine these limits accurate costs are a necessity.

It is apparent, however, that the purchaser is not interested in manufacturing costs; what he demands is the lowest price obtainable and an assurance that the material will stand up to requirements. Prompt delivery and the possibility of machining losses are contentions which the purchasing agent usually passes on to the operating departments. The precedence of price thus established, it becomes of prime importance to have accurate costs on each specific type of casting, not only to avoid the possibility of selling below cost through following the pace set by competitors, but to promote concentration of effort on the type of castings which are shown to be most profitable and to make proper discrimination of the undesirable.

To effect these results an accurate distribution of every possible item of direct labor, indirect expense, materials, burden, etc., must be pursued. And if the records of the specific character of work under consideration are not complete, a shop estimate of

the various items of direct time should be compiled at the current cost charges, so that definite conclusions can be attained.

Various methods of computing costs are in vogue. Such as are devised to meet specific shop conditions, and which properly account for every item of detailed expense, with an equitable distribution of overhead charges, no matter what the method followed, are productive of good results. Short cuts in accounting, however, which lead to fictitious conclusions, or insufficient data upon which to base calculations oftentimes amounting to mere guessing, neither of which afford any definite knowledge, are detrimental not only to the foundry employing them, but to the business in general, for they fix prices at a figure which is demoralizing to the entire trade.

ESTIMATING COSTS BY WEIGHT

A common delusion encountered by the initiated foundry cost man is costing by weight. Regardless of the fact that complicated designs and thin sections require many times the amount of work and attention in manufacture as compared with solid chunks of a like weight, this method still prevails among many prominent foundrymen. Their shop costs are compiled on a tonnage basis and weight is practically the whole consideration in fixing selling prices. In the pioneer days of the steel casting industry this method was entirely practical. Then all castings were chunks, core holes were unknown, the amount of workmanship required depended practically on size, and the cost of the metal was the foremost item of expense.

With the development of steel foundry practice came the tendency toward lighter sections, the insertion of cores or openings wherever practicable, and the employment of steel of higher physical properties to maintain the required strength. The liberal allowance of extra metal for finishing was also reduced to an absolute minimum, so that the chunky castings of the olden days have gone out of fashion.

As a result of these modified designs the percentage of losses due to bad castings has been greatly increased. Molding has become more costly since it is more difficult and tedious, and coremaking, which is accompanied by extra cleaning and dry-floor labor, as well as a reduction in the weight of the casting, is made necessary. The effect is that of "burning the candle at both ends," since the increased expense and the diminished weight cause the cost, figured on the pound basis, to leap at an astonishing rate. The metal used in this type of casting no longer plays the prominent part in the ultimate cost, as was the case with the heavy castings of former days.

ESTIMATING COSTS FOR INDIVIDUAL PATTERNS

Since, however, the use to which the castings are put restricts the cutting of weights and the extent of intricacy in manufacture, in a varied degree, it follows that the relative amount of labor in proportion to the cost of the metal entering into the production of the individual casting is very diversified

*Sales agent, Penn Steel Castings & Machine Company, Chester, Pa.

and only in the specialty shop where the product is confined to a limited number of similar classes of work, can anything approaching accuracy in costs be secured, except by estimating for cost each individual pattern separately.

This necessitates obtaining a record of each direct operation in every department of manufacture separately and the distribution of all overhead and indirect expense departmentally, since a blanket burden is essentially wrong. It is evident that castings containing no cores should not be charged with any expense, either overhead or indirect, which is attributable to the core-shop; castings made in green sand should not be encumbered with oven and dry-floor charges, and castings not receiving sand-blasting, welding, straightening, or machining should not be charged with expense belonging to these distinct departments. In the same manner, castings receiving but little attention in any department should not be loaded with as great an allotment of departmental expense as those subjected to a great amount of attention. Thus it is evident that the amount of work done on a job in each department should govern the extent of departmental charge, irrespective of size, weight or design.

The metal employed in the manufacture of a steel casting, however, should be charged by the weight used in the mold and credited with the scrap weight of the shrinkage heads, pouring gates, and other necessary extra metal. As the weight of this excess metal bears no fixed ratio to the shipping weight, being determined entirely by the design of the casting, it follows that estimating the cost of the metal must likewise be applied by the individual pattern in order to avoid false conclusions.

FIXING COSTS BY CLASSIFICATION

Class costing has been devised by some founders who have awakened to the misleading condition of the old methods. While this is a step in the right direction, it in no sense meets all demands, since the conditions already described, which necessitates costing by the individual pattern to secure accurate results, apply just as forcibly to castings of the same general class, although possibly not to such a marked extent. To specialize accurately by classes would therefore entail an unlimited number of classes in the jobbing foundry, and would be practically individual costing under another name.

To sum up, a good cost system is a necessity for a steel foundry, and it must be one which will furnish separate costs on each specific item, so as to permit individual selling prices when advisable, as well as flat or class prices, which are made available by assembling the individual costs as required. The advantages afforded in selling with the aid of this style of costing are further augmented by the economies effected in production as a result of the disclosures by this method of the leaks and weak spots in manufacture which are amenable to remedy. Thus equipped a foundry is fortified to meet competition with open eyes.

In illustrating the new formed sheet metal speedometer shaft on page 673 of *The Iron Age* of March 12, a portion of the shaft was shown with the two tenons connected together. This should of course have shown the mortise and tenon connected, as constructed by the manufacturer, the Plank Flexible Shaft Machine Company, Grand Rapids, Mich., otherwise maximum flexibility would not be realized.

The one hundred and eighth meeting of the American Institute of Mining Engineers will be held at Salt Lake City, Utah, August 10 to 14. Plans are being formulated to establish a local section at Chicago, Ill.

A Special Power Metal Sawing Machine

For cutting meteorites and other difficult tasks of this nature, the Racine Tool & Machine Company, Racine, Wis., adapted its high speed heavy duty metal cutting machine. In the accompanying engraving the machine is shown taking a cut from a nickel iron meteorite, which fell near Gibeon, German Southwest Africa, and was shipped to Racine



A Recently Developed Power Metal Sawing Machine Cutting Slabs $\frac{1}{4}$ in. Thick from a Meteorite Composed of Nickel Iron

to be cut into slabs $\frac{1}{4}$ in. thick. It will be noted that the shape of the meteor is very irregular, and it was necessary to imbed it in lead before it could be gripped in the vise of the machine.

The dimensions of the meteorite are approximately 15 x 15 in., and it was cut into a number of slices of uniform thickness in 10 hr. It is stated that this figure represents a saving of 50 hr. over the time formerly required. The work was done for a geological school, and as a result of the satisfactory way in which it was performed, an order has been placed for one of these machines for use in its experimental department.

Training Shop Teachers for the Industries

A training class for the preparation of shop teachers in industrial and trade schools is being conducted at Pratt Institute, Brooklyn, N. Y. The present class, which has about completed its course, comprises 19 men each now working in the industry, and represents the following trades: machine work, machine drafting, carpentry, pattern making, electrical wiring, electrical maintenance and plumbing. They were selected from among some 60 applicants. The course is 144 hr. in length, consisting of 4 hr. a week of lectures and round table conference and 2 hr. of practice teaching under supervision in the New York evening schools. In addition, most of the men are doing extra practice teaching.

The desire now is to secure positions for those taking the training, else, if the men after taking the training should not find positions, it will be a serious obstacle to the further development of the work. Accordingly a circular letter on the subject has been sent to vocational and trade schools by C. A. Prosser, secretary National Society for the Promotion of Industrial Education, emphasizing that the attention of local authorities should be called to the fact that experienced tradesmen who are also trained for teaching can be obtained.

ROLL PRESSURE INVESTIGATION

Power Requirements when Rolling German Billets and Shapes.

In the issues of *Stahl und Eisen* for January 1 and 8, 1914, Dr. J. Puppe, Breslau, gives extracts from a full report to appear shortly on work done by him in the spring and summer of 1910 on the subject of roll pressures and power requirements

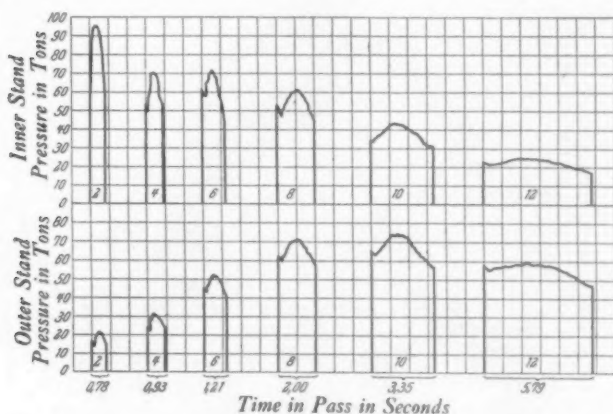


Fig. 1—Roll Pressure. Test No. 1. Bloom 3. Billets 50 x 50 mm.

when rolling billets, etc. It was carried out at the Peine steel plant on four different three-high mills, and represents an enormous amount of work, both in regard to the detailed records made and the necessary calculations. The four mills, each furnished with a flywheel, had rolls the greatest diameter of which was 22.44 in., 30.7 in., 33.46 in. and 35.43 in. respectively. The three latter were driven by steam engines, and the first one with a direct current motor. On this account satisfactory measurements regarding efficiency were only made on the first mill.

The table gives a collected description of the tests made. The first table of the 18 referred to in the first column is published. It covers four pages of *Stahl und Eisen* and connected with it are 14 illustrations and diagrams, together with drawings showing the passes from the bloom to the billet. This will give an idea regarding the magnitude of the work. Altogether the rolling pressures were obtained while rolling 101 blooms, and in the case of 46 the power used was also determined at the same time. Fig. 1 shows several characteristic pressure curves taken while rolling billets on the 22.44-in. mill. In this case, as in many others, a striking thing is that the pressure on the rolls considerably increases after the beginning of the rolling, to again diminish towards the end. In all such cases it was

noticed that the central part of the bars was considerably colder than the ends. The pressures reached are considerable, the highest being about 163 tons with the 22.44-in. mill, about 262 tons with the 30.7-in., and around 583 with the 35.43-in. mill. These are pressures that thus far have scarcely been assumed, especially for mills rolling structural steel, when calculating for housings, etc.

Fig. 2 shows values calculated from the first table regarding the rolls. In all the tests it was found that often the allowable limits of stress were exceeded both with cast iron and steel rolls. At the

same time it was found that the greatest stresses do not always come in the center of the roll, but very often at other places.

The results obtained along this line appear to be sufficiently exact so that calculations of the expected stresses can be made in regard to proposed rolling designs, and changes made if necessary so as to relieve the stresses in the middle of the roll.

Results are then given of the surface pressures on the roll bearings, which show extremely high values up to 300 to 400 kg. per sq. cm. These high values cause high friction losses, the

friction mostly generating heat. The amount of heat is so great that only vigorous water cooling, as used in all mills, keeps the bearings sufficiently cool. This friction causes a great loss of power, and should receive much more attention than it does at present. The various losses were calculated to percentages. The motor loss varies from 7 to 9.5 per cent., according to the load put on the

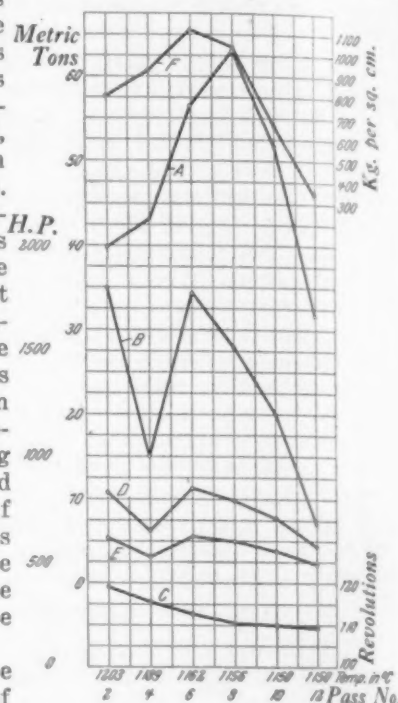


Fig. 2—Test 1. Bloom 1. Billets 50 x 50 mm.

- A. Bending moment of middle roll in metric tons.
- B. Average efficiency, excluding running empty in hp.
- C. Average revolutions.
- D. Total turning movement in metric tons.
- E. Turning movement of upper or lower roll in metric tons.
- F. Calculated stress of middle roll in kg. per sq. cm.

motors. The loss through running idle varies from 9 to 62.9 per cent. of the total power consumed. Losses of 50 per cent. are not uncommon. The amount consumed by the bearing friction varies greatly, from about 17 to 49 per cent. The effective work done is a comparatively small part of the energy used, namely, only from 27.3 to 69.8 per cent. Diagrams are given showing the money value of these various losses over a year's operation. G. B. W.

Table Giving a Collected Description of the Tests Made

Test and table No.	Section	Mill	Stands	Bars	Passes	Pressure determined	Engine efficiency determined
1	Billet, 50 x 50 mm.....	22.44-in.	1	4	6	Yes	Yes
2	Billet, 60 x 60 mm.....	22.44-in.	1	4	6	Yes	Yes
3	Angle, 60 x 60 mm.....	22.44-in.	2	6	2	Yes	Yes
4	Angle, 90 x 90 x 9.5 mm..	22.44-in.	2	8	3	Yes	Yes
5	Angle, 90 x 90 x 12 mm..	22.44-in.	1	6	5	Yes	Yes
6	I-beam, N. P. No. 8.....	22.44-in.	2	6	3	Yes	Yes
7	I-beam, N. P. No. 12.....	22.44-in.	2	7	3	Yes	Yes
8	I-beam, N. P. No. 14.....	22.44-in.	2	5	3	Yes	Yes
9	Channel, N. P. No. 12.....	22.44-in.	2	5	3	Yes	Yes
10	Billet, 65 x 65 mm.....	30.7-in.	2	6	3	Yes	No
11	I-beam, N. P. No. 16.....	30.7-in.	2	11	2	Yes	No
12	Angle, 150 x 150 mm.....	33.46-in.	2	3	2	Yes	No
13	I-beam, N. P. No. 23.....	35.43-in.	3	5	3	Yes	No
14	I-beam, N. P. No. 30.....	35.43-in.	4	3	3	Yes	No
15	I-beam, N. P. No. 30.....	35.43-in.	4	2	2	Yes	No
16	I-beam, N. P. No. 38.....	35.43-in.	4	6	2	Yes	No
17	I-beam, N. P. No. 40.....	35.43-in.	1	3	5	Yes	No
18	I-beam, N. P. No. 42½....	35.43-in.	1	3	3	Yes	No
19	I-beam, N. P. No. 42½....	35.43-in.	3	9	2	Yes	No

OPEN-HEARTH RAILS 72 P. C.

Production in 1913 Was More Than Three Times That of Bessemer Rails

The Bureau of Statistics of the American Iron and Steel Institute has just published the statistics showing that the production of all kinds of rails in 1913 amounted to 3,502,780 tons, against 3,327,915 tons in 1912, an increase of 174,865 tons, or over 5.2 per cent. Included in the total for 1913 is 195,659 tons of girder and high T steel rails for electric and street railroads, against 174,004 tons in 1912 and 205,409 tons in 1911. The maximum production of all kinds of rails was reached in 1906 at 3,977,887 tons, or 475,107 tons more than in 1913.

PRODUCTION BY CLASSES

In 1913 a total of 3,303,944 tons was rolled from open-hearth, Bessemer, and electric steel blooms or billets, against 3,165,939 tons in 1912; 43,793 tons from new seconds, defective new rails, and steel crop ends, against 42,586 tons in 1912; and 155,043 tons were rolled from old steel rails or were renewed steel rails, against 119,390 tons in 1912. No iron rails were reported for 1912 or 1913. In the following table the production of all kinds of rails in 1913 is given by States in gross tons:

	Open-hearth rails	Bessemer rails	Electric, renewed and rerolled old steel rails	Total
N. Y., N. J., and Md....	416,212	202,329	35,666	654,207
Pennsylvania	618,795	326,819	26,206	971,820
W. Va., Ala., and Ohio	632,858	.....	25,054	657,912
Ind., Ill., Wis., Kan., Cal., and Wash.....	859,845	288,443	70,553	1,218,841
Total for 1913.....	2,527,710	817,591	157,479	3,502,780
Total for 1912.....	2,105,144	1,099,926	122,845	3,327,915

As shown above the production of open-hearth rails in 1913 more than tripled the output of Bessemer rails. Included in the 157,479 tons of rails rolled in 1913 and classified as electric and rerolled steel are 2436 tons of rails rolled from electric steel and 155,043 tons of renewed rails or rails rolled from old steel rails which the makers were unable to classify as open-hearth or Bessemer. In 1912 there were 3455 tons of rails rolled from electric steel and 119,390 tons rolled from old steel rails or from renewed rails. Twenty-five works in 13 States rolled or rerolled rails in 1913, as compared with 24 works in 12 States in 1912.

The production of all kinds of rails by States is given in the following table from 1910 to 1913, in gross tons.

	1910	1911	1912	1913
N. Y., N. J., and Md..	711,975	490,980	585,817	654,207
Pennsylvania	986,702	839,663	888,672	971,820
W. Va., Ala., and Ohio	496,716	447,905	622,121	657,912
Ind., Ill., Wis., Kan., Cal., Wash., Cal.....	1,440,638	1,044,242	1,231,305	1,218,841
Total	3,636,031	2,822,790	3,327,915	3,502,780

OPEN-HEARTH RAILS

The production of open-hearth steel rails in 1913 amounted to 2,527,710 tons, against 2,105,144 tons in 1912, an increase of 422,566 tons, or over 20 per cent. Of the total in 1913, 2,514,658 tons were rolled from ingots and 13,052 tons from new seconds, defective new rails, crop ends, etc. The following table gives the production of acid and basic open-hearth rails by States from 1909 to 1913, in gross tons:

	1909	1910	1911	1912	1913
N. Y., N. J., and Pa.	335,856	445,139	579,924	712,056	924,445
Md., Ala., and Ohio	344,842	570,878	509,950	600,113	743,420
Ind., Ill., Wis., Colo., and Cal.	575,976	735,342	587,049	792,975	859,845
Total	1,256,674	1,751,359	1,676,923	2,105,144	2,527,710

There were 15 works in 9 States in 1913 which produced open-hearth rails. Pennsylvania was the largest maker of open-hearth rails in 1911, 1912, and 1913, Indiana in 1909 and 1910 and Alabama in 1907 and 1908.

BESSEMER RAILS

The production of Bessemer steel rails in 1913 amounted to 817,591 tons, against 1,099,926 tons in 1912, a decrease of 282,335 tons, or over 25.6 per cent. Of the total in 1913, 786,850 tons were rolled from ingots and 30,741 tons were rolled from new seconds, defective new rails, crop ends, etc. The following table gives the production of Bessemer steel rails by States from 1909 to 1913, in gross tons:

	1909	1910	1911	1912	1913
N. Y., N. J., and Md.....	586,193	568,353	284,230	367,128	202,329
Pennsylvania	553,719	591,473	352,331	343,837	326,819
W. Va., Ala., Ohio, Ind., Ill., Wis., Colo., Cal. & Wash.....	627,259	724,616	416,859	388,961	288,443
Total	1,767,171	1,884,442	1,053,420	1,099,926	817,591

ELECTRIC REROLLED AND RENEWED RAILS

In 1913 the production of rails rolled from steel made in electric furnaces amounted to 2436 tons, as compared with 3455 tons in 1912 and 462 tons in 1911. In 1909 and 1910 small quantities of rails were also rolled from electric steel, but these rails were included with the Bessemer and open-hearth rails reported for these two years.

The production of steel rails rolled from new seconds, defective new rails, crop ends, old steel rails, etc., including renewed rails, amounted to 198,836 tons, against 161,976 tons in 1912. Of the total in 1913, 43,793 tons were rolled from new seconds, etc., against 42,586 in 1912, and 155,043 tons were renewed rails or were rerolled from old steel rails, against 119,390 tons in 1912.

No iron rails were rolled in 1912 or 1913. In 1911 the production was 234 tons, all rolled in Illinois, and all weighing less than 45 lb. to the yard, against 230 tons in 1910.

WEIGHT PER YARD OF ALL KINDS OF RAILS

The following table gives the production of all kinds of rails in 1913, classified according to their weight per yard:

Kinds of rails	50 lb. and less than 50 lb.		85 lb. and over	Total, gross tons
	Under 50 lb.	50 lb. and less than 50 lb.		
Open-hearth steel rails	80,761	470,810	1,976,139	2,527,710
Bessemer steel rails...	110,795	433,372	273,424	817,591
Other steel rails.....	78,793	63,100	13,150	155,043
Electric steel rails....	56	31	2,349	2,436
Iron rails	None.	None.	None.	None.
Total	270,405	967,313	2,265,062	3,502,780

WEIGHT OF ALL KINDS OF RAILS FROM 1906 TO 1913

The following table gives the production of all kinds of rails from 1906 to 1913, according to the weight of the rails per yard. As shown below the rail classification by weight per yard was slightly changed in 1913.

Years	45 lb. and less than 45 lb.		85 lb. and over	Total, gross tons
	Under 45 lb.	45 lb. and less than 45 lb.		
1906.....	284,612	1,749,650	1,943,625	3,977,887
1907.....	295,838	1,569,985	1,767,831	3,633,654
1908.....	183,869	687,632	1,049,514	1,921,015
1909.....	255,726	1,024,856	1,743,263	3,023,845
1910.....	260,709	1,275,339	2,099,983	3,636,031
1911.....	218,758	1,067,696	1,536,336	2,822,790
1912.....	248,672	1,118,592	1,960,651	3,327,915
1913.....	*270,405	†967,313	2,265,062	3,502,780

*Include rails under 50 lb. †Include 50 lb. and less than 85 lb.

Girder and high T steel rails for electric and street railways are included in the total. As already stated, the maximum production of all kinds of rails was reached in 1906.

PRODUCTION OF ALL KINDS OF RAILS BY PROCESSES

In the following table the production of all kinds of rails from 1906 to 1913 is given by processes. Of the total production in 1913 about 72.16 per cent. was rolled from open-hearth steel, about 23.34 per cent. from Bessemer steel, and about 4.50 per cent. from electric steel, old steel rails and renewed rails.

Years	Open-hearth	Bessemer	Re-rolled	Electric	Iron	Total, gross tons
1906....	186,413	3,791,459	Not separated	15	3,977,887	
1907....	252,704	3,380,025		925	3,633,654	
1908....	571,791	1,349,153		71	1,921,015	
1909....	1,256,674	1,767,171		...	3,023,845	
1910....	1,751,359	1,884,442	*91,751	462	3,636,031	
1911....	1,676,923	1,053,420		234	2,822,790	
1912....	2,105,144	1,099,926		3,455	3,327,915	
1913....	2,527,710	817,591		2,436	3,502,780	

*Rerolled from old steel rails and renewed rails which the manufacturers could not classify as Bessemer or open-hearth.
†Small tonnages rolled in 1909 and 1910 but included with Bessemer and open-hearth rails for these years.

ALLOY STEEL RAILS

Included in the 3,502,780 tons of steel rails rolled in 1913 are 59,519 tons of rails rolled from alloy-treated steel, as compared with 149,267 tons in 1912. The following table gives the production by processes of alloy-treated steel rails since 1909:

	Open-hearth and electric	Bessemer	Total, gross tons
Alloy rails			
Titanium steel rails.....	30,653	17,002	47,655
Manganese, copper, and nickel.	2,914	8,960	11,864
Total for 1913.....	33,567	25,952	59,519
Total for 1912.....	40,393	108,874	149,267
Total for 1911.....	38,539	115,450	153,989
Total for 1910.....	27,389	229,935	257,324
Total for 1909.....	13,696	35,699	49,395

By far the largest part of the production of rails rolled from alloy-treated steel weighed 85 lb. or over. Only 9505 tons weighed less than 85 lb. to the yard.

The following table gives the output by kinds since 1909 of rails rolled from alloy-treated steel:

Alloy rails—gross tons	1909	1910	1911	1912	1913
Titanium steel rails	35,945	256,759	152,990	141,773	47,655
Mang., cop., nickel, etc.	13,450	565	999	7,494	11,864
Total	49,395	257,324	153,989	149,267	59,519

Silicon Steel for Rails

In a paper before the Institution of Civil Engineers, London, England, February 24, William Willcox stated that he had recently made tests of various kinds of steel rails in the curve between Farringdon street and Aldersgate on the electrified portion of the Metropolitan Railway because the reduction in the life of rails in tunnels had been from an average of five years to an average of less than three years and in certain places to less than one year. Chemical analyses, tensile tests, tup tests and impression tests were made of all the rails used. As a result silicon steel rails were found best suited to conditions. The author stated that "the high silicon steel which has been used for the last seven years in order to get better results in the matter of durability than can be got from ordinary steel is made by the Sandberg process, whereby during manufacture the whole of the silicon is extracted and a known quantity added. The process referred to can be applied to basic open-hearth, basic Bessemer, and acid Bessemer steels. The ascertained results show undoubtedly a longer life as compared with rails of ordinary steel, and steel so treated has the further property of being considerably less liable to rusting."

The number of broken silicon rails has been very small during the last six years, it was stated. The wear of one of these rails after a service of five years was only $\frac{1}{8}$ lb. per yd. Manganese rails, after a period of 2½ years, though wearing away, are wearing evenly, showing no signs of battering.

At the same meeting Stephen Sellen read a paper on "The Cause and Cure of Rail Corrugation" in which he stated that "there is recent evidence that a high proportion of silicon added to rail steel gives a satisfactory increase of life by its greater resistance to corrugation as well as to ordinary wear."

The Norma Company of America, maker of Norma ball, roller, thrust and combination bearings, will remove its offices April 11 from 20-24 Vesey street to 1790 Broadway, New York City.

Lake Superior Iron Ore in 1913

The publication of the shipments of Lake Superior iron ore by mines in 1913 by the Iron Trade Review shows a total of 49,947,116 tons as against 48,221,546 tons in 1912, an increase of 1,725,570 tons. The all-rail shipments were 876,638 tons, this amount being added to the total by lake, which was compiled by *The Iron Age* at the close of navigation and appeared in our issue of December 4, 1913. The shipments by ranges for four years were as follows in gross tons:

	1913	1912	1911	1910
Marquette ...	3,966,680	4,202,308	2,833,116	4,392,724
Menominee ..	4,965,604	4,711,440	3,911,174	4,237,738
Gogebic	4,531,558	5,006,266	2,603,318	4,315,314
Vermillion ...	1,566,600	1,844,981	1,088,930	1,203,177
Mesaba	34,038,643	32,047,409	22,093,532	29,201,760
Cuyuna	733,021	305,111	147,431	.....
Miscellaneous..	145,010	104,031	115,629	91,682
Total	49,947,116	48,221,546	32,793,130	43,442,397

The Steel Corporation's share of the total in 1913 was 49.06 per cent. as against 49.46 per cent. in 1912 and 52.70 per cent. in 1911. Its highest percentage was 56 in 1907. The amount of ore taken out on the Steel Corporation's Great Northern lease last year is put at about 5,150,000 tons. This leaves the corporation about 525,000 tons short of the minimum amounts provided for in the Hill lease to the end of 1913. The minimum for 1914 is 6,000,000 tons, so that 6,525,000 tons remains to be taken out before the surrender of the lease at the end of the present year.

The Mesaba Range percentage of the total shipment was 68.15 in 1913 against 66.46 in 1912 and 67.37 in 1911. The Cuyuna Range shipped 733,021 tons last year against 305,111 tons in 1912.

There were 20 new shipping mines last year as against 13 in 1912, 12 in 1911 and 16 in 1910. Nine of the 20 were on the Mesaba range and four on the Cuyuna. The total of shipping mines in 1914 was 223, against 194 in 1912.

On the Canadian side the Helen mine shipped 42,550 tons in 1913 and the Magpie, also of the Lake Superior Corporation, 19,934 tons. The Moose Mountain mine shipped last year 102,238 tons. None of the Canadian outputs are included in the above table.

The National Association of Brass Manufacturers held its spring meeting at the Sherman House, Chicago, on Wednesday and Thursday, March 18 and 19. The meeting was well attended and much was accomplished. The List Committee asked for and received same additional information and instructions pertaining to the new official catalogue it is now working on, and which it is intended to issue and circulate January 1, 1915. Committees were appointed to take up the question of freight rates and the adjustment of classifications and report at the next meeting. Invitations for the next meeting were extended by San Francisco, Toledo and New Orleans, but after careful consideration the association concluded to hold its midsummer meeting in Detroit, Mich., in June, just preceding the joint meetings that will be held in that city by the Eastern, New England and Central Supply associations.

February's foreign trade shrank considerably. The Division of Statistics of the Department of Commerce reports exports of merchandise at \$173,808,468, against \$203,071,078 in January. The imports of merchandise were \$149,937,011, against \$154,742,923 in January. As compared with February, 1913, the exports fell off \$20,188,474 and the imports \$23,093. The excess of exports in February was \$23,871,457, against an excess in January of \$49,328,155.

The Efficiency Society of Rochester has been organized with a membership of about sixty. H. S. Moody, Bausch & Lomb Optical Company is president, and A. Thomson, Jr., General Railway Signal Company, is one of the directors. The meetings of the society, which has affiliated with the International Efficiency Society, are to be held on the first Monday of each month in the Hotel Rochester.

United States Steel Corporation's 1913 Report

Gross Receipts, \$796,894,299.23. Increase on Previous Year, \$51,388,783.75, or 7 Per Cent. Net Earnings, \$137,181,344.83. Increase on Previous Year \$29,006,671.71, or 27 Per Cent.

The twelfth annual report of the United States Steel Corporation, which gives the result of operations in the year ended December 31, 1913, shows an increase in gross sales and earnings of \$51,388,783.75, or 7 per cent., as compared with 1912. The net earnings increased \$29,006,671.71, or 27 per cent., due to the higher average prices received in 1913, which on domestic business were \$2.40 per ton and on export business \$4.16 per ton more than in 1912. The report, which covers operating results of all the subsidiaries, including the Tennessee Coal, Iron & Railroad Company, enables the following comparison of the financial outcome of the year:

INCOME AND SURPLUS		
	1913	1912
Gross receipts, sales and earnings	\$796,894,299.23	\$745,505,515.48
Manufacturing cost and ordinary maintenance	610,383,511.53	609,420,249.50
Administrative and general expenses	19,587,315.29	17,760,567.15
Taxes	13,225,882.26	9,840,371.12
Discounts and interest	3,855,873.65	3,941,298.52
Balance	149,841,716.50	104,543,029.19
Sundry manufacturing and operating revenues and rentals ..	714,026.87	3,344,564.41
Income from investments, etc. .	3,638,614.46	3,001,787.06
Total income	154,194,357.83	110,889,380.66
Interest charges subsidiary companies	9,985,271.98	9,751,728.90
Balance	144,209,085.85	101,137,651.76
Net balance profits earned by subsidiary companies	-7,027,741.02	+7,037,021.36
Net earnings	137,181,344.83	108,174,673.12
Depreciation funds, etc.	23,972,376.13	22,734,365.82
Balance	113,208,968.70	85,440,307.30
Bond interest and sinking fund ..	31,204,285.53	31,182,560.37
Balance	82,004,683.17	54,257,746.93
Sundry credit adjustments	787,697.55	17,697.56
Total available for dividends, etc.	81,216,985.62	54,240,049.37
Preferred dividends paid	25,219,677.00	25,219,677.00
Common dividends paid	25,415,125.00	25,415,125.00
Balance, surplus	\$30,582,183.62	\$3,605,247.37

An appropriation of \$15,000,000 was made from the 1913 surplus "on account of expenditures made on authorized appropriations for additional property and construction and the discharge of capital obligations," leaving \$15,582,183.62, which added to the surplus carried over from 1912 made the total undivided surplus December 31, 1913, \$151,798,428.89, exclusive of profits earned by subsidiary companies on inter-company sales of products on hand in inventories.

The undivided surplus, exclusive of inter-company profits on inventories, at the close of each quarter in 1913 was as follows: First quarter, \$144,085,844.82; second quarter, \$157,705,209.18; third quarter, \$169,053,986.71; fourth quarter, \$151,798,428.89.

During the year a total of \$16,807,366 of bonds, mortgages and purchase money obligations was paid off. Of this total, the amount redeemed through the sinking funds of the mortgages was \$8,342,000.

CONDENSED BALANCE SHEET

Following is a condensation of the general balance sheet as of December 31, 1913, liabilities from one subsidiary company to another being omitted from both assets and liabilities:

Assets	
Property account	\$1,465,498,631.73
Deferred charges	7,455,381.02
Investments	3,407,182.83
Sinking and reserve fund assets ..	20,467,393.81
Inventories	167,634,791.41
Accounts receivable	58,024,386.51
Bills receivable	7,866,695.58
Agents' balances	1,039,574.29
Marketable bonds and stocks	2,241,275.61
Cash	66,951,010.42
Total	\$1,800,586,323.26

Liabilities

Common stock	\$508,302,500.00
Preferred stock	360,281,100.00
Outstanding stock of subsidiary companies ..	889,542.50
Bonded and debenture debt	627,097,376.68
Mortgages and purchase money obligations subsidiary companies	9,865,809.03
Accounts payable and payrolls	27,508,292.20
Special deposits or loans due employees and others	988,481.35
Accrued taxes not yet due	8,900,501.61
Accrued interest and unpresented coupons ..	8,521,084.95
Unreferred dividend, payable February 27, 1914	6,304,919.25
Common dividend, payable March 30, 1914 ..	6,353,781.25
Sundry reserve funds	29,074,505.55
Appropriations for capital expenditures	55,000,000.00
Surplus, exclusive of profits earned by subsidiary companies on inter-company sales of products on hand in inventories	151,798,428.89
Total	\$1,800,586,323.26

PRODUCTION

The production of the subsidiary companies for the year 1913 compared with the year 1912 was as follows:

Products	1913 Tons	1912 Tons
Iron ore mined:		
In the Lake Superior Region:		
Marquette Range	583,266	551,575
Menominee Range	980,346	995,401
Gogebic Range	1,871,700	1,497,950
Vermilion Range	1,301,163	1,301,663
Mesaba Range	21,634,206	20,001,953
In the Southern Region:		
Tennessee Coal, Iron & Railroad Company's mines	2,367,770	2,079,907
Total	28,738,451	26,428,449
Coke manufactured:		
In beehive ovens	11,062,138	11,554,840
In by-product ovens	5,601,342	5,164,547
Total	16,663,480	16,719,387
Coal mined, excluding that for coke ..	6,705,381	5,905,153
Limestone quarried	6,333,509	6,124,541
Blast furnace production:		
Pig iron	13,879,706	13,990,329
Spiegel	65,236	53,829
Ferromanganese and ferrosilicon ..	135,788	142,006
Total	14,080,730	14,186,164
Steel ingot production:		
Bessemer	6,131,809	6,643,147
Open hearth	10,524,552	10,258,076
Total	16,656,361	16,901,223
Rolled and other finished products for sale:		
Steel rails (heavy and light and girder)	1,927,745	1,857,407
Blooms, billets, slabs, sheet and tin bars	842,175	1,103,752
Plates	1,108,147	1,076,308
Heavy structural shapes	998,624	898,537
Merchant bars, hoops, bands, skelp, etc.	2,024,192	1,910,512
Tubing and pipe	1,186,740	1,111,138
Wire rods	174,478	196,720
Wire and products of wire	1,432,182	1,629,717
Sheets (black and galvanized) and tin plate	1,280,537	1,508,607
Finished structural work	652,363	599,301
Angle splice bars and other rail joints	256,676	192,488
Spikes, bolts, nuts and rivets	86,465	83,426
Axles	159,075	142,367
Steel carwheels	93,375	85,931
Sundry steel and iron products	152,064	130,408
Total	12,374,838	12,506,619
Smelter	30,424	31,318
Sulphate of iron	33,829	35,215
Universal Portland cement	11,197,000	10,114,500

CLASSIFICATION OF BUSINESS

The volume of business represents the aggregate gross value of the commercial transactions conducted by the several subsidiary companies, and includes sales made between the subsidiary companies and the gross receipts of the transportation companies for services

(Continued on page 813)

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Future Steel Price Fluctuations

It is frequently said that the years of wide fluctuations in steel prices are past and that the future is likely to see relatively slight fluctuations. The arguments adduced in support of such a theory are far from conclusive.

The principal argument, of course, is that with the greatly reduced tariff the foreign market will exercise a leveling influence upon our own. The argument runs that since fluctuations are narrow abroad they are going to become narrow at home. The premises, however, are not very well taken. Steel ship plates in the Middlesbrough market, for instance, advanced from £6 15s. at the beginning of 1912 to £8 5s. by November of the same year, or from 1.467c to 1.794c per pound, an advance of \$6.50 per net ton. If such fluctuations can occur in free trade England, it can hardly be maintained that we shall not have fluctuations in our market when we are reduced only to a partly free trade basis.

Another argument mentioned in support of the theory that we shall have narrower fluctuations in the future is that the character of demand has changed. Steel is going into the everyday use of the people much more largely than formerly, so runs the familiar reasoning, while the large projects which have to be financed are taking a smaller proportion, and since it is the latter class of demand which tends most to fluctuate, demand in future will be steadier, and hence prices will be steadier.

It is doubtless true that in recent years, or since 1907, a smaller percentage of our steel has gone into large new projects, but it remains entirely possible that such consumption is merely held in abeyance; that some time in the future a period of expansion will occur in which large projects will come to the front again, perhaps even in more impressive form than in the past. The steel industry as now constituted could not take care of such a demand, for it has been shown that without any large work on the boards, and with the everyday requirements expressed only in terms of a very moderate degree of general business prosperity, the steel industry can be engaged at about two-thirds of its capacity. Easily there are possibilities in the future much more than equal to the task of engaging that other third.

The past is not without its lessons, if one would heed them, of how unsafe it is to make predictions as to the future of the iron industry. Lately it has been suggested that the merchant furnaces in the

Mahoning and Shenango valleys have no great future before them; but some 16 years ago it was definitely predicted "the day of the merchant furnace in the valleys is over" and yet within a couple of years those furnaces were selling pig iron at about \$25 a ton. In 1898 Andrew Carnegie made a prediction which has often been referred to as a suggestion of "how not to do it." He predicted a "great future" for the steel industry, but the basis therefor was the fact that steel was selling "three pounds for two cents"—meaning \$15 billets—and insisted that no high prices could prevail, while any steel concern (meaning the Illinois Steel Company) which had bonds could not hope to succeed. What has occurred since is familiar history. Steel did not have to sell even at three pounds for three cents instead of two cents in order to make its way, and much needed extensions to various plants were only secured by the issue of bonds, which have been taken care of easily.

Coupled with the argument that foreign markets will govern our own markets more in future than in the past, there is usually the observation that our prices have been tending downward, in respect to the fact that each successive "boom" sees a lower maximum; that 1902 did not attain the high level of 1899, while 1907 barely reached the 1902 level, and 1909 and 1912 fell far short of reaching the 1907 level. The juxtaposition of arguments is not altogether happy, for it chances that this same narrowing in the fluctuations has not occurred abroad. Citing again the Middlesbrough plate market, we find there was a high point of £8 7s. 6d. (1.821c) in 1900; in 1906-7 the high point was £7 10s. (1.631c), while in 1912 the high point was £8 5s. (1.794c), showing a higher level reached in 1912 than in 1906-7 by \$3.25 a ton, whereas in our own market the 1912 maximum was \$4 a ton below the 1906-7 maximum. Thus the trend abroad is not necessarily toward narrower fluctuations as the years pass.

The New Tariff Not Yet Tested

The February statistics of imports and exports just issued have enabled the Department of Commerce to make up a statement which is of some interest as bearing on the operation of the new tariff. This statement shows that in the five months beginning with last October, when the new tariff became effective, merchandise valued at \$769,891,343 was imported, compared with \$798,155,684 in the same period one year previous. This is some-

what surprising, as it had been expected that the lower duties effective in the new tariff would considerably increase our imports. Not only have our imports not increased but they have actually decreased by \$28,264,341.

This showing cannot be taken as proof that the lower tariff duties will not operate to stimulate imports. Conditions have been radically different in the last five months from those prevailing a year previous. We have been passing through a period of decided depression and it is still with us, whereas a year ago all branches of business were active. At present this country is purchasing sparingly both abroad and in our own home markets. Merchants and manufacturing consumers, who might buy in foreign markets, are proceeding cautiously, not adding to their stocks while business is depressed, evidently waiting either for a quickening in the demand from their own trade or for prices of what they buy to recede to a level which will be considered attractive.

Meanwhile evidences are not wanting that foreign manufacturers and merchants are laying foundations for increased business with this country. Agencies are being established here and trade connections are being formed which will be in readiness to take advantage of any improvement in business that may develop. It will be remarkable, indeed, when we have a trade revival, if it will not be found that foreign manufacturers will figure notably in participating in the benefits of the enlarged volume of business.

Railroad Building and Rail Output

The history of railroad building in the United States naturally divides itself into two great eras, the first of rapid building of the new road, the second of relatively light building of new road but of heavy expenditures for the improvement of old roads, in other words increasing the capacity of existing roads. The great era of new building culminated with the burst of activity in the eighties.

In the years 1880 to 1890 inclusive the building of new road totaled 82,000 miles, an average of 7455 miles a year, the two greatest years being 1882 and 1887, each with about 12,000 miles to its credit. During the half century preceding 1880 the annual increase in mileage had been large in percentage; but at the beginning of 1880 the total mileage in operation was only 86,556 miles, so that in the 11 years following almost as great a mileage was constructed as in the preceding half century. The statistics just quoted are all drawn from Poor's reports.

Since 1890 the building of new road has followed a different and much narrower course. This era naturally divides into three periods: very light building in the eight years 1891 to 1898 inclusive, relatively heavy building in the nine years 1899 to 1907 inclusive, and moderately light building in the six years 1908 to 1913 inclusive. The first of these periods, which included the industrial depression of the nineties, but was controlled particularly by the fact that the railroads were in an insecure position either from too much building or too much issuing of securities—there is no occasion to argue as to

details—involved the building of an average of 2953 miles a year. The second period, including a time when industry generally expanded at a rapid rate and railroad securities were marketed with relative ease, showed an average of 4948 miles of railroad built per year. The third period, in which industry has expanded much less rapidly and, as it dates from the panic of 1907, a period in which railroad securities have been marketed with difficulty, shows an average of 3402 miles of new road per year.

The production of rails has been governed in part by these fluctuations in the building of new road, increasing rapidly in the era during which new building was very heavy, but languishing for years after 1890. The maximum production in the first era was 2,139,640 tons in 1887, while the minimum in the second era was 1,021,772 tons in 1894.

In the period of relatively heavy building, 1899 to 1907 inclusive, the demand for rails for new track was supplemented very greatly by the necessity of relaying tens of thousands of miles of old track for the reason that the rails were too light for the increased duty occasioned by the much heavier rolling stock introduced. It was also supplemented by extensive second tracking, the building of sidings and the enlargement of yards and terminals. The great railroad blockade of 1902 drove home upon all railroad managers the fact that the capacity of their roads was not governed by the capacity of their main line tracks, but by the capacity of their yards and terminals. In this period of moderate new building, of extensive relaying and of important yard, terminal, siding and second tracking work, a maximum rail production of 3,977,887 tons was reached in 1906.

In the present period, the years following 1907, requirements for new railroad as well as for improvements have made less impress upon the rail market, but since the aggregate service, in passenger and freight movement, has greatly increased, there has been an increase in replacement work. In the quarter century from 1885 to 1910 the ton-mileage of freight carried by all roads was more than quintupled.

In these circumstances it is natural that rail production should show relatively little variation. Last year's total, as officially reported within the past week, was 3,502,780 gross tons, which is 5.2 per cent. more than the production in 1912 and 11.6 per cent. more than the average in the entire six years following 1907, which we have adopted as a distinct period in rail requirements.

A contest is now being fiercely waged which will determine the position of the railroads for a period of years. The outcome of this contest will have an influence upon rail consumption, but not probably a very large one as iron and steel tonnage figures go, for, figuring rail consumption on the basis of production plus imports minus exports, as is done for the past 40 years in the official statistics, it develops that there was a consumption of 2,276,921 tons in 1887, that amount proving a maximum for no less than 14 years, while the maximum since then has been 3,654,794 tons in 1906. Thus from 1887 to 1906, 19 years, there was an increase of only 60 per cent., and in the six years following no new maximum has been made. Other branches of the steel industry normally show much more spectacular increases.

The testimony of the 1913 rail statistics may in all probability be accepted as final with respect to the Bessemer rail. The proportion of Bessemer rails in the total has of course been rapidly decreasing in recent years; it was 93.0 per cent. in 1907, 33.1 per cent. in 1912 and 23.3 per cent. in 1913. There was a lingering hope that alloying might sufficiently improve the Bessemer rail to retain it as an important factor in the competition, but the latest statistics dispel even this hope. The maximum production of alloyed rails (including titanium rails as alloyed) was in 1910, at 257,324 tons, of which 229,935 tons was Bessemer. Such alloying has rapidly decreased, until in 1913 only 59,519 tons was alloyed, of which 25,952 tons was Bessemer. Not only has the practice of alloying greatly decreased, but in 1913 for the first time a larger tonnage of open-hearth steel than of Bessemer was so alloyed. The inference is obvious that the existing knowledge of alloying is powerless to save the Bessemer rail.

A Great Drop in Steel Exports

Comment can better be made on the astonishing falling off in our iron and steel exports in January, when the statistics are available showing the destination of the shipments. The obvious inference is that the slowing down of business in Canada, which is our principal outside market for iron and steel products, is very largely responsible for the decline. This seems reasonable also from the fact that Great Britain and Germany, whose iron and steel exports to Canada are relatively small, made a good tonnage showing in their January foreign trade statements. Great Britain shipped out 454,794 gross tons in that month, or 15,759 tons more than in January, 1913, while Germany's January exports were 499,627 tons, or only 286 tons less than for the preceding January. From the United States, as shown in detail in the tables we printed last week, the exports of iron and steel products reported by weight were only 118,768 tons in January, while in January, 1913, they were 249,489 tons, or more than twice as much, and in December last 195,723 tons, or 64 per cent. more.

In the absence of full data, it is of course assuming something to say that our steel manufacturers have been holding their own in the countries in which they compete with Germany and Great Britain. It is improbable, however, that so sudden and marked a change should have come over the general alignment of the three countries in export markets, while the known condition of Canadian industry might well furnish an adequate explanation.

The Alien Contract Labor Law

In all the more recent discussion of proposals to restrict immigration, the alien contract labor law has had little attention in proportion to its importance and the desirability of amending it. It is conceded that under the existing statutes many undesirable aliens are admitted to the country. But opinions differ widely on proposals to raise the standards of physical and educational requirements.

Though ranking high in intelligence, the skilled workman in the industrial arts is completely barred,

if his services are contracted for abroad by the American manufacturer, even if the bargain be only one of inference. The penalty of such violation of the act is severe. From the purely physical standpoint the skilled workman and presumably his family would be above the average. After his day his children would remain as one of the better strains in the nation's blood. But such a man is excluded from the United States, if any one has promised him employment in his trade.

If, in spite of the selfish opposition of certain classes of labor, this embargo were raised completely, permitting the American employer openly to send his agents abroad to seek skilled workmen, the average quality of immigration would be raised perceptibly. The country has great need of highly trained men. It especially needs certain classes of experts who no longer are bred here in any number because of changes in social conditions, and because of the unwillingness of the trades to take on young men and pass down through them broad training in the mechanic arts.

The new tariff demands the highest efficiency in manufacture, if there is to be successful competition with other countries; yet efficiency is limited in many cases by the quality of workmen. Perhaps there was a time when the alien contract labor law was a necessary protection to skilled American labor; but there have been many changes since its enactment, and today it can be classed in the increasing list of legislative retarders of industrial development.

Business Has Had a Ducking

"Business has had a ducking," says Judge E. H. Gary, chairman of the United States Steel Corporation, in the National Sunday Magazine of March 22. He adds, however, in a short article which has been copyrighted by the Abbott & Briggs Company, that it is drying off and is ready and eager to take a fresh start. "The volume of business at this time, although large because the country is so vast, is," he continues, "not half so great as it ought to be or as it could be. It is high time for all of us to wake up to a realization of the fact that we are in competition with other countries, which are striving for supremacy."

"Why discourage honest, sincere movements which are intended to maintain a fair equilibrium as to the rights of all classes of people; or those intended to prevent oppression or wrong; or such as may furnish full and equal opportunity to every one honestly and properly to advance his own welfare and interests?"

"The people of a nation prosper or fail together; the unnecessary destruction of one or of a few adversely affects the whole body; and, while the application of the principles of good morals is of the highest importance, the man whom it is sought to influence by these considerations lends an unwilling ear unless, at the same time, his material wants are satisfied. There is placed upon those in power and authority at the present time a very great responsibility. No doubt they will measure up to it. What I have said has not been uttered with any feeling of despondency. On the contrary, there is ground for optimism. We have, perhaps, been more or less enveloped in clouds of doubt and distrust and hesitancy, but I think we are now approaching the dawn of the greatest prosperity."

CONFERENCE BOARD ON SAFETY

CONTENTS

Manufacturers' Associations Lay Plans for a Co-operative Campaign

The members of the safety and sanitation committees of the national employers' associations met with the officers of the National Founders' Association, the National Metal Trades Association, the National Association of Manufacturers, the American Foundrymen's Association and the National Electric Light Association at Buffalo on Monday, March 23, to confer with reference to the development of a co-operative spirit among the national committees. There was in mind the definite formulation of plans and methods for safety and sanitation work in the shops of members of these associations. The following were present at the conference:

William H. Barr, president Lumen Bearing Company, Buffalo; president National Founders' Association.

W. H. Van Dervort, Root & Van Dervort Engineering Company, Moline, Ill.; chairman Safety Committee, National Metal Trades' Association.

Henry B. Sargent, Sargent & Co., New Haven, Conn.; National Metal Trades' Association.

John B. Hibbard, commissioner, National Metal Trades' Association.

Magnus W. Alexander, General Electric Company, West Lynn, Mass., chairman Committee on Safety and Sanitation, National Founders' Association.

T. L. Richmond, Buffalo Scale Company, American Foundrymen's Association.

Charles B. Scott, Middle West Utilities Company, Chicago, secretary Accident Prevention Commission National Electric Light Association.

Col. George Pope, Pope-Hartford Company, president National Association of Manufacturers.

J. P. Bird, general manager National Association of Manufacturers.

Ferd. C. Schwedtmann, Racine Sattley Company, Springfield, Ill.; chairman Accident Prevention Commission, National Association of Manufacturers.

An informal address was given by Mr. Alexander on safety appliances and methods, and after discussion the following resolution was adopted:

Whereas, The great necessity of continuous interchange of ideas and permanent co-operation in matters of safety and sanitation is apparent; therefore, be it

Resolved, That we the representatives of national employers' associations here assembled do create a conference board, composed of the presidents of each association or his duly appointed representative, and one other, preferably the chairman of its safety committee; be it further

Resolved, That this conference board may appoint subcommittees to take up specific work in which the various associations shall have joint interests.

William H. Barr was elected chairman of the conference board. The general sentiment of the meeting was that the association should do this kind of work, and plans were decided upon which it is thought will result to the advantage of all their members. The purpose is to provide for the working out and adoption of the best safety devices and the development of a more perfect system of plant inspection, etc. By co-operation in this planning a duplication of effort will be avoided.

The time of the next conference was left to the decision of the chairman.

At the semi-monthly meeting of the Cleveland Engineering Society, Cleveland, Ohio, March 24, an illustrated paper on "Iron and Steel; the Heat Treatment and Selection for Engineering Purposes" was presented by James A. Herron, consulting engineer, Cleveland. A lecture on "Lighting" will be given by E. E. F. Creighton, General Electric Company, Schenectady, N. Y., at a special meeting March 31. At the regular meeting April 14, Walter N. Crafts, engineer, Oberlin, Ohio, will present an illustrated paper on "The Electric Furnace for Steel Making."

A Modern Plant Making Cold Drawn Steel.....	767
Large Automatic Gear-Cutting Machine.....	771
New Line of Boring Mills.....	772
A Pneumatic Recording Tachometer.....	773
Railroad Supply Exhibit.....	773
Hydraulic Shaft Straightening Machine.....	774
Engine Type Commutating Pole Generators.....	774
Machinery Palace at San Francisco.....	775
The Balboa Foundry for the Panama Canal.....	776
Spraying Molten Metals.....	779
Hard Water for Boiler Feed.....	780
Heavy Duty Horizontal Drilling Machine.....	781
Some Interesting Tests of Filtered Oil.....	782
The Dr. Von Bauer Coke Ovens.....	782
Side Seaming Machine for Metal Barrels.....	783
Trade Directory of South America.....	783
Universal Electric Grinding Machine.....	783
Breakdowns of Machinery.....	784
A Horning Press of Rather Unusual Size.....	785
An Electric Device for Shifting Gears.....	785
Incandescent Lamps for Large Areas.....	785
Steel Casting Costs and Sales.....	786
A Special Power Metal Sawing Machine.....	787
Training Shop Teachers for the Industries.....	787
Roll Pressure Investigation.....	788
Open-Hearth Rails 72 Per Cent.....	789
Silicon Steel for Rails.....	790
Lake Superior Iron Ore in 1913.....	790
United States Steel Corporation's 1913 Report.....	791
Future Steel Price Fluctuations.....	792
The New Tariff Not Yet Tested.....	792
Railroad Building and Rail Output.....	793
A Great Drop in Steel Exports.....	794
The Alien Contract Labor Law.....	794
Business Has Had a Ducking.....	794
Conference Board on Safety.....	795
Metal Trades Association and Tool Builders.....	795
The Iron and Metal Markets.....	796
British Iron and Steel Exports.....	807
Personal.....	808
Obituary.....	808
Pittsburgh and Valleys Business Notes.....	809
Pig Steel from Ore in the Electric Furnace.....	810
Coke Plant Safeguards.....	812
Iron Two Centuries Old.....	814
Durability of Iron and Steel Tanks.....	815
Steel Corporation Benzol Recovery Plant.....	815
Lehigh Valley Safety Campaign.....	815
The Machinery Markets.....	816
Trade Publications.....	826

Metal Trades Association and Tool Builders

The Administrative Council of the National Metal Trades Association has decided to advance its convention dates at Worcester, Mass., one day, to enable the members to attend also the convention of the National Machine Tool Builders' Association. Following is the revised programme:

Monday, April 20

Executive Committee meeting, 9:00 a. m.
Administrative Council meeting, 2:00 p. m.
Alumni dinner, 7:00 p. m.

Tuesday, April 21

Meeting of local presidents, secretaries and Administrative Council, 10:00 a. m.
Buffet lunch to members attending convention, 1.00 p. m.
Opening session of convention, 2:00 p. m.

Wednesday, April 22

Convention, 9:00 a. m.
Convention, 2:00 p. m.
Meeting of incoming Administrative Council, immediately after adjournment of convention.
Annual dinner, 7:00 p. m.

The National Machine Tool Builders' Association may hold its spring meeting at Worcester, immediately following the metal trades convention. Nothing definite has been decided. The original idea was to meet in New York or in Atlantic City, but the fact that so many men are members of both associations has made the Worcester plan popular, and a mail ballot is now being taken to decide the question.

The Iron and Metal Markets

A DRIFTING MARKET

Buyers Wait and Prices Weaken

Structural Contracts in Fair Volume at Low Prices—Bessemer Pig Iron Lower

In a good many lines buyers of iron and steel products are marking time and it is evident that the total of new bookings in March will fall far below that of February. While there has been little change in the rate of production at rolling mills, some restriction of operations is expected soon unless new demand increases materially.

Prices for the second quarter in bars, plates and structural shapes, it is now apparent, will not be higher than have been realized in the first quarter. Weakness has developed in a number of directions. It is most pronounced in plates, which are selling at 1.15c. and less at Pittsburgh.

Structural work is fairly satisfactory as to volume but not as to prices. The scramble for the 35,000 tons of work let last week showed many hungry shops, and the 1.15c. basis for plain material was broken through more than once. The American Bridge Company's share of the total was about 9000 tons. It is figured that something like 200,000 tons of steel work is in sight.

The Jerome Avenue elevated work in the Bronx, 15,000 tons, is understood to have gone to Milliken Brothers, Inc. In addition to 50,000 tons of elevated third tracking, which will probably be parceled out to a number of bidders, over 15,000 tons of new subway work is about to be let. These public contracts have been most timely, and the prices now made may prove tempting in other directions. The Chicago union depot terminal, requiring first and last 75,000 tons, is a project that will soon be classed as live.

The Pennsylvania rail order should not be long coming to the mills. For special cropping of the ingot this road now pays 55 cents a ton extra. The new specification will mean a still larger extra charge. A 6000-ton order has come from the Frisco receivers and the Soo Line has bought 3000 tons. For the New York, Ontario & Western 5400 tons was divided among three mills.

Car builders are fast cleaning up their orders and their bids on recent contracts show the closest approach to cost in many months. Yet such prices did not prevent the New York Central's decision to do nothing now about the 3500 cars it has been so close to buying.

Bars have not yielded to the same extent as plates and shapes in recent competition, but implement works are specifying poorly on their contracts. On the other hand, reinforcing bars promise a better demand than last season's.

In spite of the falling off in the country's steel exports, the Steel Corporation's export business is still running considerably in excess of its tonnage of all descriptions traceable to railroad demand.

The Scotch Steel Makers' Association has had one of its periodic disruptions and ship plates have declined \$4 to \$5 a ton; but it is to be remembered that the pool price has long been nominal.

The effort of pig iron makers to establish higher prices is general. Little can be said as to its success, since consumers have been carefully letting the market alone. It is the evident hope of makers that some of the recent advances will hold when buying really sets in again. Bessemer iron is weaker. A sale of 1500 tons has established a \$14 price at Valley furnace, a decline of 25 cents.

The city of Rochester has awarded 8700 tons of cast-iron pipe to the leading maker at \$21.90. Private buying of pipe has increased but competition is sharp and prices have suffered.

After its remarkable ascent of late January, in which skillful manipulation was no small factor, the old material market has gradually settled until today practically the old levels have been touched and the supply is well in excess of the demand.

A Comparison of Prices

Advances Over the Previous Week in Heavy Types, Declines in Italics

At date, one week, one month, and one year previous				
	Mar. 25, 1914.	Mar. 18, 1914.	Feb. 25, 1914.	Mar. 26, 1913.
Pig Iron, Per Gross Ton:				
No. 2 X, Philadelphia...	\$15.00	\$15.00	\$15.00	\$17.75
No. 2, Valley furnace...	13.25	13.25	13.25	16.25
No. 2 Southern, Cin'ti...	14.00	14.00	14.00	16.25
No. 2, Birmingham, Ala.	10.75	10.75	10.75	13.00
No. 2, furnace, Chicago*	14.25	14.25	14.25	17.25
Basic, del'd, eastern Pa.	14.25	14.00	14.25	17.50
Basic, Valley furnace...	13.00	13.00	13.25	16.00
Bessemer, Pittsburgh...	14.90	15.15	15.15	18.15
Malleable Bess., Ch'go*	14.25	14.25	14.00	17.25
Gray forge, Pittsburgh...	13.65	13.65	13.65	16.75
L. S. charcoal, Chicago...	15.25	15.25	15.25	18.00

Billets, etc., Per Gross Ton:

Bess. billets, Pittsburgh...	21.00	21.00	21.00	28.50
O.-h. billets, Pittsburgh...	21.00	21.00	21.00	29.00
O.-h. sheet bars, P'gh...	22.00	22.00	22.00	29.50
Forging billets, base, P'gh.	25.00	25.00	25.00	36.00
O.-h. billets, Phila.....	23.40	23.40	23.40	30.00
Wire rods, Pittsburgh...	26.50	26.50	26.50	30.00

Old Material, Per Gross Ton:

Iron rails, Chicago.....	12.75	12.75	13.25	16.25
Iron rails, Philadelphia..	16.50	16.50	16.50	18.00
Carwheels, Chicago.....	11.75	11.75	12.25	16.75
Carwheels, Philadelphia..	12.25	12.25	12.75	15.00
Heavy steel scrap, P'gh.	12.00	12.25	12.75	14.25
Heavy steel scrap, Phila.	11.00	11.25	11.00	13.50
Heavy steel scrap, Ch'go.	9.75	9.75	10.25	12.25
No. 1 cast, Pittsburgh...	11.50	11.50	12.00	14.25
No. 1 cast, Philadelphia..	13.00	13.00	13.00	14.00
No. 1 cast, Ch'go (net ton)	10.25	10.25	10.75	12.50

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.25	1.25	1.25	1.25
Iron bars, Philadelphia..	1.22 1/2	1.25	1.27 1/2	1.67 1/2
Iron bars, Pittsburgh...	1.35	1.35	1.40	1.70
Iron bars, Chicago.....	1.15	1.15	1.12 1/2	1.57 1/2
Steel bars, Pittsburgh...	1.20	1.20	1.20	1.85
Steel bars, New York...	1.36	1.36	1.36	2.01
Tank plates, Pittsburgh...	1.15	1.15	1.20	1.70
Tank plates, New York...	1.31	1.31	1.36	1.76
Beams, etc., Pittsburgh...	1.15	1.20	1.20	1.70
Beams, etc., New York...	1.31	1.31	1.36	1.76
Skelp, grooved steel, P'gh	1.20	1.20	1.25	1.45
Skelp, sheared steel, P'gh	1.25	1.25	1.35	1.50
Steel hoops, Pittsburgh...	1.25	1.30	1.30	1.60

Sheets, Nails and Wire,

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh.	1.95	1.95	1.95	2.35
Galv. sheets, No. 28, P'gh	2.95	2.95	2.95	3.50
Wire nails, Pittsburgh...	1.60	1.60	1.60	1.80
Cut nails, Pittsburgh...	1.65	1.65	1.65	1.70
Fence wire, base, P'gh...	1.40	1.40	1.40	1.60
Barb wire, galv., P'gh...	2.00	2.00	2.00	2.20

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Coke, Connellsville,

	Mar. 25, 1914.	Mar. 18, 1914.	Feb. 25, 1914.	Mar. 26, 1913.
Per Net Ton at Oven:	\$1.85	\$1.90	\$1.85	\$2.30
Furnace coke, prompt....	2.00	2.00	2.00	2.50
Furnace coke, future....	2.40	2.40	2.50	3.00
Foundry coke, prompt....	2.65	2.65	2.75	3.00
Foundry coke, future....				

Metals.

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York...	14.87 1/2	14.75	15.00	15.00
Electrolytic copper, N. Y.	14.50	14.25	14.50	14.87 1/2
Spelter, St. Louis.....	5.12 1/2	5.15	5.20	6.05
Spelter, New York.....	5.27 1/2	5.30	5.35	6.20
Lead, St. Louis.....	3.87 1/2	3.90	3.87 1/2	4.20
Lead, New York.....	4.00	4.00	4.00	4.35
Tin, New York.....	38.50	38.40	38.12 1/2	46.75
Antimony, Hallett's, N. Y.	6.75	6.75	7.00	8.50
Timplate, 100-lb. box, P'gla	\$3.30	\$3.30	\$3.30	\$3.60

Finished Iron and Steel f. o. b. Pittsburgh

Freight rates from Pittsburgh, in carloads, per 100 lb.: New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Louis, 22 1/2c.; Kansas City, 42 1/2c.; Omaha, 42 1/2c.; St. Paul, 32c.; Denver, 84 1/2c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 80c. on plates, structural shapes and sheets No. 11 and heavier; 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes.

Plates.—Tank plates, 1/4 in. thick, 6 1/4 in. up to 100 in. wide, 1.15c. to 1.20c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers with extras:

Rectangular plates, tank steel or conforming to manufacturer's standard specifications for structural steel dated February 6, 1903, or equivalent, 1/4 in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered 1/4-in. plates. Plates over 72 in. wide must be ordered 1/4 in. thick on edge, or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 3-16 in. take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras	Cents per lb.
Gauges under 1/4 in. to and including 3-16 in.....	.10
Gauges under 3-16 in. to and including No. 8.....	.15
Gauges under No. 8 to and including No. 9.....	.25
Gauges under No. 9 to and including No. 10.....	.30
Gauges under No. 10 to and including No. 12.....	.40
Sketches (including straight taper plates) 3 ft. and over.....	.10
Complete circles 3 ft. in diameter and over.....	.20
Boiler and flange steel.....	.10
"A. B. M. A." and ordinary firebox steel.....	.20
Still bottom steel.....	.30
Marine steel.....	.40
Locomotive firebox steel.....	.50
Widths over 100 in. up to 110 in., inclusive.....	.05
Widths over 110 in. up to 115 in., inclusive.....	.10
Widths over 115 in. up to 120 in., inclusive.....	.15
Widths over 120 in. up to 125 in., inclusive.....	.25
Widths over 125 in. up to 130 in., inclusive.....	.50
Widths over 130 in.....	1.00
Cutting to lengths, under 3 ft., to 2 ft. inclusive.....	.25
Cutting to lengths, under 2 ft., to 1 ft. inclusive.....	.50
Cutting to lengths, under 1 ft.....	1.55
No charge for cutting rectangular plates to lengths 3 ft. and over.	

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, 1/4 in. thick and over, and zees, 3 in. and over, 1.15c. to 1.20c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.....	.10
H-beams over 18 in.....	.10
Angles over 6 in. on one or both legs.....	.10
Angles, 3 in. on one or both legs, less than 1/4 in. thick, as per steel bar card, Sept. 1, 1909.....	.70
Tees, structural sizes (except elevator, hand rail, car truck and conductor rail).....	.05
Channel and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909.....	.20 to .80
Deck beams and bulb angles.....	.30
Hand rail tees.....	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive.....	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive.....	.50
Cutting to lengths, under 1 ft.....	1.55
No charge for cutting to lengths 3 ft. and over.	

Wire Products.—Fence wire, Nos. 0 to 9 per 100 lb., terms 60 days or 2 per cent. discount in 10 days, carload lots to jobbers, annealed, \$1.40; galvanized, \$1.80. Galvanized barb wire and fence staples to jobbers, \$2; painted, \$1.60. Wire nails to jobbers, \$1.60. Prices of the foregoing wire products to dealers in carload lots are 5c. higher. Woven wire fencing, 73 1/2 per cent. off list for carloads; 72 1/2 off for 1000-rod lots; 71 1/2 off for less than 1000-rod lots.

The following table gives the price to retail mer-

chants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	0 to 9	10	11	12&12 1/2	13	14	15	16
Annealed	\$1.60	\$1.65	\$1.70	\$1.75	\$1.85	\$1.95	\$2.05	\$2.15
Galvanized	2.05	2.05	2.10	2.15	2.25	2.35	2.75	2.85

Wire Rods.—Bessemer, open-hearth and chain rods, \$26.50 to \$27.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on steel pipe in effect from February 2, 1914, and iron pipe from June 2, 1913, all full weight:

Steel.			Iron.		
Inches.	Black.	Galv.	Inches.	Black.	Galv.
1/2, 3/4 and 1	72 1/2	52	1/2 and 3/4	66	47
1 1/2	76 1/2	66	3/4	65	46
3/4 to 3	79 1/2	71	1 1/2	69	56
			2 1/2 to 2 1/2	72	61

Lap Weld			Lap Weld		
Inches.	Black.	Galv.	Inches.	Black.	Galv.
2 1/2 to 6	76 1/2	68	1 1/2	56	45
7 to 12	78 1/2	70	1 1/2	67	56
13 to 15	75 1/2	65	2	68	58
	52 1/2	..	2 1/2 to 4	70	61
			4 1/2 to 6	70	61
			7 to 12	68	56

Reamed and Drifted			Reamed and Drifted		
Inches.	Black.	Galv.	Inches.	Black.	Galv.
1 to 3, butt.....	77 1/2	69	1 to 1 1/2, butt....	70	59
2, lap.....	74 1/2	66	2, butt.....	70	59
2 1/2 to 6, lap....	76 1/2	68	1 1/2, lap.....	54	43
			1 1/2, lap.....	65	54
			2, lap.....	66	56
			2 1/2 to 4, lap....	68	59

Butt Weld, extra strong, plain ends			Butt Weld, extra strong, plain ends		
Inches.	Black.	Galv.	Inches.	Black.	Galv.
1/2, 3/4 and 1	67 1/2	57	3/4	63	52
1 1/2	72 1/2	66	1 1/2	67	60
3/4 to 1 1/2	76 1/2	70	3/4 to 1 1/2	71	62
2 to 3	77 1/2	71	2 and 2 1/2	72	63

Lap Weld, extra strong, plain ends			Lap Weld, extra strong, plain ends		
Inches.	Black.	Galv.	Inches.	Black.	Galv.
2	73 1/2	65	1 1/2	65	59
2 1/2 to 4	75 1/2	67	2	66	58
4 1/2 to 6	74 1/2	66	2 1/2 to 4	70	61
7 to 8	67 1/2	57	4 1/2 to 6	69	60
9 to 12	62 1/2	52	7 and 8	63	53
			9 to 12	58	47

Butt Weld, double extra strong, plain ends			Butt Weld, double extra strong, plain ends		
Inches.	Black.	Galv.	Inches.	Black.	Galv.
1/2 to 1 1/2	62 1/2	56	1/2	57	49
3/4 to 1 1/2	65 1/2	59	3/4 to 1 1/2	60	52
2 to 2 1/2	67 1/2	61	2 and 2 1/2	62	54

Lap Weld, double extra strong, plain ends			Lap Weld, double extra strong, plain ends		
Inches.	Black.	Galv.	Inches.	Black.	Galv.
2	63 1/2	57	2	55	49
2 1/2 to 4	65 1/2	59	2 1/2 to 4	60	54
4 1/2 to 6	64 1/2	58	4 1/2 to 6	59	53
7 to 8	57 1/2	47	7 to 8	52	43

To the large jobbing trade an additional 5 and 2 1/2 per cent. is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts to jobbers, in carloads, in effect from January 2, 1914, are as follows:

Lap Welded Steel		Standard Charcoal Iron	
Inches.	Black.	Inches.	Black.
1 1/2 and 2 in.....	61	1 1/2 in.....	45
2 1/2 in.....	58	1 1/2 and 2 in.....	49
2 1/2 and 3 in.....	64	2 1/2 in.....	45
3 and 3 1/2 in.....	69	2 1/2 to 3 in.....	54
3 1/2 and 4 1/2 in.....	71	3 and 3 1/2 in.....	57
5 and 6 in.....	64	3 1/2 to 4 1/2 in.....	60
7 to 13 in.....	61	5 and 6 in.....	49

Locomotive and steamship special charcoal grades bring higher prices.

2 1/2 in. and smaller, over 18 ft., 10 per cent. net extra.

2 1/2 in. and larger over 22 ft., 10 per cent. net extra. Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under to destinations east of the Mississippi River; lengths over 22 ft., and all shipments going west of the Mississippi River must be sold f.o.b. mill at Pittsburgh basing discount, lowered by two points.

Sheets.—Makers' prices for mill shipment on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms 30 days net or 2 per cent. cash discount in 10 days from date of invoice:

Blue Annealed Sheets		Cents per lb.	
Nos.	3 to 8	Nos.	9 to 10
Nos. 3 to 8	1.40 to 1.45	Nos. 9 to 10	1.45 to 1.50
Nos. 9 to 10	1.45 to 1.50	Nos. 11 and 12	1.50 to 1.60
Nos. 11 and 12	1.50 to 1.60	Nos. 13 and 14	1.55 to 1.65
Nos. 13 and 14	1.55 to 1.65	Nos. 15 and 16	1.65 to 1.70
Nos. 15 and 16	1.65 to 1.70		

Box Annealed Sheets, Cold Rolled		Cents per lb.	
Nos.	10 and 11	Nos.	12 and 13
Nos. 10 and 11	1.60 to 1.65	Nos. 12 and 13	1.60 to 1.65
Nos. 12 and 13	1.60 to 1.65	Nos. 14 and 15	1.65 to 1.70
Nos. 14 and 15	1.65 to 1.70	Nos. 16 and 17	1.70 to 1.75
Nos. 16 and 17	1.70 to 1.75	Nos. 18 and 19	1.75 to 1.80
Nos. 18 and 19	1.75 to 1.80	Nos. 20 and 21	1.80 to 1.85
Nos. 20 and 21	1.80 to 1.85	Nos. 22 and 23	1.85 to 1.90
Nos. 22 and 23	1.85 to 1.90	Nos. 24 and 25	1.90 to 1.95
Nos. 24 and 25	1.90 to 1.95	Nos. 26 and 27	1.95 to 2.00
Nos. 26 and 27	1.95 to 2.00	Nos. 28 and 29	2.00 to 2.05
Nos. 28 and 29	2.00 to 2.05	Nos. 30	2.10 to 2.15
Nos. 30	2.10 to 2.15		

Galvanized Sheets of Black Sheet Gauge

	Cents per lb.
Nos. 10 and 11.....	1.95 to 2.00
No. 12.....	2.05 to 2.10
Nos. 13 and 14.....	2.05 to 2.10
Nos. 15 and 16.....	2.20 to 2.25
Nos. 17 to 21.....	2.35 to 2.40
Nos. 22 and 24.....	2.50 to 2.55
Nos. 25 and 26.....	2.65 to 2.70
No. 27.....	2.80 to 2.85
No. 28.....	2.95 to 3.00
No. 29.....	3.10 to 3.15
No. 30.....	3.25 to 3.30

Pittsburgh

PITTSBURGH, PA., March 25, 1914.

Two facts stand out prominently in connection with the situation in the steel trade to-day. One is that prices for second quarter delivery are not likely to be higher than in the first quarter, and the other is that unless a heavier demand comes out in the next week or so operations of steel mills will have to be restricted. When the buying movement took place late in January and early February, jobbers loaded up pretty heavily with stocks, which they have not been able to work off owing to bad weather causing lack of demand from consumers. Orders for iron and steel products are very light; in fact not enough new business is coming out to test prices. Efforts by makers to get higher prices for the second quarter have not been successful. In January and February shipments were heavy and deliveries were made on many contracts that called for delivery in March and April. In rail contracts deliveries of 10,000-ton lots or more have already been made to the roads that specified for shipments in second quarter. It was a question of shutting down or running on these orders and anticipating shipments. In practically all lines of finished iron and steel the mills will sell for second quarter at present prices, and some such business has been closed. The discouraging features are the lack of demand from the railroads and the fact that the agricultural implement makers are not specifying on their contracts. While the present situation is discouraging it is believed that two or three weeks of good weather would help business very much. Pig iron, billets and sheet bars are quiet, but with prices fairly steady. On plates and steel bars 1.15c. is more common, and this price is being more often named on shapes. Specifications for tin plate are heavy, but sheets and wire products have quieted down. The demand for merchant pipe has fallen off and coke and scrap are dull.

Pig Iron.—Small lots of foundry iron are moving from the furnaces to consumers on the basis of \$13.25 to \$13.50 Valley furnace. On a recent inquiry for 500 tons of basic iron two sellers quoted \$13 at Valley furnace, but state that they did not get the business. Prices on Bessemer have given way. A sale of 1500 tons, for equal delivery in April, May and June, has been made at \$14, Valley furnace. We quote: Bessemer, \$14; basic, \$13; No. 2 foundry, \$13.25 to \$13.50; gray forge, \$12.75 to \$13; malleable Bessemer, \$13.25 for delivery through first half of this year, all at Valley furnace, the freight rate to the Pittsburgh or Cleveland district being 90c. a ton.

Billets and Sheet Bars.—No new inquiry is out for either billets or sheet bars, and specifications have fallen off to some extent from sheet mills on account of the lessened demand for sheets. Tin plate mills are specifying freely for bars, as most of them are running to full capacity. In view of the general quietness in the steel business some doubt is expressed as to whether the price of \$23 named by some makers for sheet bars for second quarter delivery can be obtained. We quote Bessemer and open-hearth billets at \$21 and Bessemer and open-hearth sheet bars at \$22, f.o.b. makers' mills, Pittsburgh or Youngstown, for the rest of this quarter. We quote forging billets at \$25 on desirable specifications, embracing only one size, and up to and including 10 x 10 in., the regular extras being charged for larger sizes. On small orders forging billets are held at \$26. We quote axle billets at \$23 for desirable orders and \$24 for small orders.

Muck Bar.—Prices have gone off on account of the lower wage rate for puddling and the lower price for forge iron, as well as lack of inquiry. We quote best

grades of muck bar made from all pig iron nominally at \$27.50 to \$28, delivered to consumers' mills in the Pittsburgh district.

Steel Rails.—The situation in standard sections is unsatisfactory to the rail mills, as the railroads are not showing much inclination to place contracts. The Carnegie Steel Company recently completed shipping 10,000 tons to the Philadelphia & Reading Railroad on a contract taken some time ago. It has just received an order for 20,400 Carnegie steel ties for the International Railway Company, an electric street car line at Buffalo. The demand for light rails from the lumber and mining interests is fair, the Carnegie Company having received new orders and specifications last week for about 2200 tons. We quote splice bars at 1.50c. and standard section rails at 1.25c. Light rails, rolled from billets, are quoted as follows, with concessions on desirable orders: 25, 30, 35, 40 and 45 lb. sections, 1.25c.; 16 and 20 lb., 1.30c.; 12 and 14 lb., 1.35c., and 8 and 10 lb., 1.40c., all in carload lots, f.o.b. Pittsburgh.

Wire Rods.—Most consumers being covered to July 1, there is little new inquiry and specifications are only fair. We quote Bessemer, open-hearth and chain rods at \$26.50, Pittsburgh, but on a firm offer for desirable tonnage this price might be shaded about 50c.

Skelp.—The new demand has quieted down, owing to the falling off in business in pipe. We quote grooved steel skelp, 1.20c. to 1.25c.; sheared steel skelp, 1.25c. to 1.30c.; grooved iron skelp, 1.60c. to 1.65c., and sheared iron skelp, 1.65c. to 1.70c., delivered to consumers' mills in the Pittsburgh district.

Ferroalloys.—New business is only for an occasional carload or two for prompt shipment. The asking price of 80 per cent. ferromanganese is still \$38, seaboard, but local dealers say \$37 could be done on a firm offer. The freight rate from Baltimore to Pittsburgh is \$2.16 a ton. We note sales of two carloads of 50 per cent. ferrosilicon at \$73, which is firmly held. We quote 50 per cent. ferrosilicon, in lots up to 100 tons, at \$73; over 100 tons to 600 tons, \$72; over 600 tons, \$71, delivered in the Pittsburgh district. We quote 10 per cent. ferrosilicon at \$20; 11 per cent., \$21, and 12 per cent., \$22, f.o.b. cars Jackson County, Ohio, or Ashland, Ky., furnaces. We quote 20 per cent. spiegeleisen at \$25 at furnace. We quote ferro-titanium at 8c. per lb. in carloads; 10c. in 2000-lb. lots and over, and 12½c. in less than 2000-lb. lots.

Plates.—The present condition in the plate trade is very unsatisfactory to the makers and prices showing a tendency to go lower. In fact, 1.15c. at mill is being named by most sellers on any desirable business. No important car orders have been placed. The steel car builders are fast cleaning up their orders and will soon be short of work. We quote ¼-in. and heavier plates at 1.15c. to 1.20c., Pittsburgh. The Carnegie Steel Company has not yet announced any change in its policy of quoting 1.25c.

Structural Material.—Some fair-sized jobs were placed the past week, but inquiry is light. The Jones & Laughlin Steel Company has taken an addition to the Munsey publication building in Washington, D. C., 1200 tons; an addition to the Union Savings Bank & Trust Company, 1400 tons, and a new high school building at Binghamton, N. Y., 900 tons. The McClintic-Marshall Construction Company has taken 300 tons for the Bedell building in this city, and the Riter-Conley Mfg. Company 300 tons of plates and shapes for dam No. 48 at Louisville, Ky. Prices on plain material are weaker. While 1.20c. is the usual asking price, desirable orders could be placed at 1.15c. at mill, Pittsburgh.

Iron and Steel Bars.—The demand for both iron and steel bars is quiet, and specifications have shown a falling off. The implement trade is specifying for very little material of any kind. Steel bars for reinforcing purposes are in fair demand and indications for this material this year are encouraging, as it is believed building will be active, owing to easy money conditions and the low prices ruling for building materials of all kinds. Common iron bars are weak at 1.35c. and on a desirable order this price might be shaded. It can also be noted that desirable orders

for steel bars would probably be taken by some makers at 1.15c. at mill. We quote steel bars for prompt shipment at 1.20c., and iron bars at 1.35c., f.o.b. makers' mill, Pittsburgh. Extras for twisting reinforcing steel bars over the base price are as follows: $\frac{3}{4}$ in. and over, \$1; $\frac{1}{2}$ to 11/16 in., \$1.50; under $\frac{1}{2}$ in., \$2.50 per net ton. This is the schedule of extras in force by mills that roll steel bars from billets, but mills that roll bars from old rails sometimes omit them entirely.

Sheets.—More disposition is being shown by makers to sell for delivery through second quarter on the basis of about 2c. for No. 28 black and 3c. for No. 28 galvanized. In fact, it is believed a good deal of business has been taken by some for second quarter shipment at these prices. The present demand is light and specifications against contracts are coming in at a moderate rate. Operations of sheet mills are being restricted to some extent, due to the diminished demand. Some mills are running from 60 to 65 per cent. and others to about 75 per cent. For April delivery we quote No. 28 Bessemer black sheets at 1.95c. to 2c.; No. 28 galvanized, 2.95c. to 3c.; Nos. 9 and 10 blue annealed sheets, 1.45c.; No. 28 tin mill black plate, H. R. and A., 1.90c. to 1.95c.; Nos. 29 and 30, 1.95c. to 2c. These prices are f.o.b. Pittsburgh, in carload and larger lots, jobbers charging the usual advances for small lots from store.

Tin Plate.—The situation in this branch is being disturbed to some extent by offerings from two or three companies whose mills were not completed in time to participate in the heavy contracts placed by consumers last fall. In some cases, consumers have been tendered tin plate by these makers at slightly lower prices than named in the fall contracts, and some business has thus been diverted. New orders are only for small lots, as most consumers are covered for their entire needs this year. We quote 100 lb. cokes at \$3.30 to \$3.40 and 100 lb. ternes at \$3.20 to \$3.30 per base box, f.o.b. Pittsburgh.

Wire Products.—A seasonable falling off in specifications has occurred, as jobbers and consumers of wire nails have pretty well covered their needs for the next month or six weeks. During the brisk demand for nails and wire that existed late in January and early in February, shipments by the mills were heavy, and jobbers accumulated large stocks which they have not been able to move to the retail trade, on account of the bad condition of the country caused by heavy snows, which made the roads impassable. Nothing has been heard in regard to the expected advance on wire and wire nails, and several makers state that there is no warrant at present for higher prices. We quote: Wire nails, \$1.60; plain annealed wire, \$1.40; galvanized barb wire and fence staples, \$2; painted barb wire, \$1.60, all per 100 lb., f.o.b. Pittsburgh, with actual freight charge to point of delivery, terms being 30 days net less 2 per cent. off for cash in 10 days. We quote cut nails at \$1.65, f.o.b. Pittsburgh. Discounts on woven wire fencing are 73½ per cent. off in carload lots, 72½ per cent. off on 1000-rod lots and 71½ per cent. on less than 1000-rod lots, all f.o.b. Pittsburgh.

Hoops and Bands.—Most consumers are covered to July; hence the new demand is only for small lots. Specifications are not so active now as in early February. Prices on both hoops and bands are showing a weaker tendency. We quote steel bands at 1.20c., with extras as per the steel bar card, but on desirable contracts 1.15c. could be done. We quote steel hoops at 1.25c. to 1.30c., f.o.b. mill, Pittsburgh.

Shafting.—Makers report that specifications from implement makers and the automobile trade have fallen off very much and the new demand is light. We quote cold-rolled shafting in carload and larger lots at 63 to 64 per cent. and in small lots from 60 to 62 per cent. off delivered in base territory, depending on the order.

Spikes.—The only active inquiry out is from the Chesapeake & Ohio Railroad for 3000 kegs. Prices are unchanged. We quote standard sizes of railroad spikes at \$1.45 to \$1.50 and small railroad and boat spikes at \$1.55 to \$1.60, per 100 lb., f.o.b. Pittsburgh.

Nuts, Bolts and Rivets.—Jobbers and consumers having accumulated fairly heavy stocks of nuts and bolts during the buying movement early last month, the new

demand is not active and mostly for small lots. Boiler and locomotive shops are not running full and therefore boiler rivets are quiet. We quote button-head structural rivets at \$1.65 to \$1.70 and cone-head boiler rivets at \$1.75 to \$1.80, in carload lots, an advance of \$2 to \$3 a ton over these prices being charged for small lots, depending on the order. Terms are 30 days net, less 2 per cent. for cash in 10 days. Discounts on nuts and bolts are as follows in lots of 300 lb. or over, delivered within a 20c. freight radius of makers' works:

Coach and lag screws.....	80 and 5% off
Small carriage bolts, cut threads.....	80% off
Small carriage bolts, rolled threads.....	80 and 5% off
Large carriage bolts.....	75 and 5% off
Small machine bolts, cut threads.....	80 and 5% off
Small machine bolts, rolled threads.....	80 and 10% off
Large machine bolts.....	75 and 10% off
Machine bolts, c.p.c. & t nuts, small.....	80% off
Machine bolts, c.p.c. & t nuts, large.....	75 and 5% off
Square h.p. nuts, blanked and tapped.....	\$6.30 off list
Hexagon nuts.....	\$7.20 off list
C.p.c. and r sq. nuts, blanked and tapped.....	\$6.00 off list
Hexagon nuts, $\frac{3}{4}$ and larger.....	\$7.20 off list
Hexagon nuts, smaller than 9/16.....	\$7.20 off list
C.P. plain square nuts.....	\$7.80 off list
C.P. plain hexagon nuts.....	\$5.50 off list
Semi-fin. hex. nuts, $\frac{3}{4}$ and larger.....	85 and 5% off
Semi-fin. hex. nuts, smaller than 9/16.....	85, 10 & 10% off
Rivets, 7/16 x 6½, smaller & shorter.....	80, 10 & 5% off
Rivets, metallic tinned, bulk.....	80, 10 and 5% off
Rivets, tin plated, bulk.....	80, 10 and 5% off
Rivets, metallic tinned, packages.....	80, 10 and 5% off
Standard cap screws.....	70, 10 and 10% off
Standard set screws.....	75, 10 and 10% off

Merchant Steel.—Mills report specifications not so active as last month, while the new demand is quiet and only for small lots. Jobbers have quite heavy stocks, which are not moving out freely to consumers. We quote: Iron finished tire, $\frac{1}{2}$ x 1½ in. and larger, 1.35c., base; under $\frac{1}{2}$ x 1½ in., 1.50c.; planished tire, 1.55c.; channel tire, $\frac{3}{4}$ to $\frac{7}{8}$ and 1 in., 1.85c. to 1.95c.; 1½ in. and larger, 1.95c.; toe calk, 1.95c. to 2.05c., base; flat sleigh shoe, 1.70c.; concave and convex, 1.75c.; cutter shoe, tapered or bent, 2.25c. to 2.35c.; spring steel, 1.95c. to 2.05c.; machinery steel, smooth finish, 1.80c. We quote cold-rolled strip steel as follows: Base rates for 1 in. and 1½ in. and wider, under 0.20 carbon, and No. 10 and heavier, hard temper, 3.25c.; soft, 3.50c.; coils, hard, 3.15c.; soft, 3.40c.; freight allowed. The usual differentials apply for lighter sizes.

Standard Pipe.—The mild weather of the past few days has increased the new demand for pipe to some extent, but it is not so heavy as in the first half of February. The new demand for oil well supplies is active, and shipments by the mills are excellent. A number of large projects for gas and oil lines are under way, and if these go through it will mean a large demand for the requisite sizes. Discounts on iron and steel pipe are reported as fairly well maintained.

Old Material.—The local market is inactive, most consumers having covered for all the scrap they will need for some time. Prices on strictly high grade heavy steel scrap have declined to \$12, delivered at buyer's mill. There were no important sales in the past week. Dealers quote as follows, per gross ton, for delivery to consumers' mills in the Pittsburgh and nearby districts:

Selected heavy steel scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh delivery.....	\$12.00 to \$12.25
Compressed side and end sheet scrap.....	\$11.25 to \$11.50
No. 1 foundry cast.....	11.50 to 11.75
No. 2 foundry cast.....	10.25 to 10.50
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district.....	8.50 to 8.75
Re-rolling mills, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.....	13.00 to 13.25
No. 1 railroad malleable stock.....	11.00 to 11.25
Railroad grate bars.....	10.25 to 10.50
Low phosphorus melting stock.....	14.75 to 15.00
Iron car axles.....	22.50 to 23.00
Steel car axles.....	15.50 to 16.00
Locomotive axles, steel.....	20.00 to 20.50
No. 1 busheling scrap.....	10.25 to 10.50
No. 2 busheling scrap.....	7.25 to 7.50
Machine shop turnings.....	8.00 to 8.25
Old car wheels.....	11.25 to 11.50
Cast-iron borings.....	8.25 to 8.50
Sheet bar crop ends.....	12.00 to 12.25
Old iron rails.....	14.00 to 14.25
No. 1 railroad wrought scrap.....	11.50 to 11.75
Heavy steel axle turnings.....	8.50 to 8.75
Heavy breakable cast scrap.....	12.00 to 12.25

†Shipping point.

Boiler Tubes.—The market on tubes is not satisfactory, the demand being restricted. Discounts are more or less shaded.

Coke.—The local market has latterly been extremely quiet. Prices on standard blast furnace coke for prompt shipment are not so firm as they have been. For second quarter delivery two or three large interests are holding standard grades of furnace coke firm at \$2.10 per net ton at oven, but for prompt shipment it can be bought at \$1.85 to \$1.90. Standard 72-hr. foundry coke is held at \$2.50 to \$2.75 per net ton at oven to consumers. The output of coke in the Upper and Lower Connellsville regions for the week ended March 14 was 353,405 tons, being an increase over the previous week of about 8000 tons, according to the Connellsville Courier.

Effective April 1, George J. Leix will be connected with the Ohio Iron & Metal Company as assistant district manager for the Pittsburgh district. H. D. Stalnaker is manager. For 14 years Mr. Leix has been connected with the Pressed Steel Car Company, Pittsburgh, in the purchasing department.

Chicago

CHICAGO, ILL., March 25, 1914.—(By Wire.)

Conditions now obtaining in the marketing of iron and steel emphasize with marked significance to what extent the territory into which mills can ship has been localized. Prices prevailing in the West, if profitable at all, can be attractive only to Western mills. The tendency of the past week was toward lighter specifications of structural and plate tonnage. Western sheet and merchant mills are fairly well fortified with business to June 1. Reinforcing bar tonnage is showing a noteworthy increase as compared with previous years. But for all of these products prices are far from firm, largely for the reason that Western mills are disposed to preserve for themselves tonnage emanating from their natural territory. Contracts for fabricated steel awarded during the week were unimportant, but the passage of ordinances providing for the construction of a union depot terminal in this city paves the way for a project which will ultimately involve the purchase of steel estimated to reach 75,000 tons. Work is expected to begin within 60 days. Many consumers who are postponing specifications for mill shipments in carload and larger lots are meeting their mandatory requirements out of store and jobbers' business shows improvement in contrast with a decrease in mill bookings. Consumers of scrap decline to accumulate tonnage beyond their current consumption.

(By Mail)

Rails and Track Supplies.—With the exception of an inquiry for about 1000 tons of tie plates from the Chicago, Milwaukee & St. Paul and a recent order for 2000 tons of rails, placed with the Illinois Steel Company by the Chicago Junction, new railroad business reported is negligible. We quote standard railroad spikes at 1.50c. to 1.55c., base; track bolts with square nuts, 2c. to 2.10c., base, all in carload lots, Chicago; tie plates, \$26 to \$28 net ton; standard section Bessemer rails, Chicago, 1.25c., base; open hearth, 1.34c.; light rails, 25 to 45 lb., 1.25c.; 16 to 20 lb., 1.30c.; 12 lb., 1.35c.; 8 lb., 1.40c.; angle bars, 1.50c., Chicago.

Pig Iron.—The trading of the week fails to reveal any indications of renewed interest on the part of consumers. A test made among users of Southern iron, who were solicited for offers at an attractive price, failed to develop a single evidence of interest. The market for Southern iron continues on the basis of \$10.75 to \$11, Birmingham, for No. 2 foundry. Northern furnaces report a few sales of small lots for which full prices were obtained. There is, in fact, no incentive sufficient to induce concessions. Tonnage on the books is satisfactory in volume, but, unless the situation changes radically, much of the iron booked for delivery in the first half will still be unshipped in the third quarter. The following quotations are for iron delivered at con-

sumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace and do not include a local switching charge averaging 50c. a ton:

Lake Superior charcoal	.....\$15.25 to \$16.25
Northern coke foundry, No. 1	..... 14.75 to 15.00
Northern coke foundry, No. 2	..... 14.25 to 14.75
Northern coke foundry, No. 3	..... 14.00 to 14.25
Southern coke, No. 1 f'dry and 1 soft	15.60 to 16.10
Southern coke, No. 2 f'dry and 2 soft	15.10 to 15.60
Southern coke, No. 3	..... 14.60 to 15.10
Southern coke, No. 4	..... 14.10 to 14.60
Southern gray forge	..... 13.85 to 14.35
Southern mottled	..... 13.35 to 13.85
Malleable Bessemer	..... 14.25 to 14.50
Standard Bessemer	..... 17.00
Basic	..... 13.75 to 14.25
Jackson Co. and Ky. silvery, 6 per cent.	16.90 to 17.40
Jackson Co. and Ky. silvery, 8 per cent.	17.90 to 18.40
Jackson Co. and Ky. sil'vy, 10 per cent.	18.90 to 19.40

Structural Material.—Contracts for fabricated steel awarded last week include 1300 tons for the Haas Realty Company building at Los Angeles, taken by the Baker Iron Works; 920 tons for the Peck building, Kansas City, Mo., to be furnished by the Kansas City Structural Steel Company; the new plant of the Illinois Vinegar Mfg. Company, Chicago, 285 tons, to A. Bolter's Sons; 250 tons for the Gartland Apartment building, San Francisco, to the Central Iron Works, which company will also furnish 260 tons for the Labor Temple in the same city; Milliken Brothers, Inc., will fabricate 400 tons of steel for a Southern Pacific and Santa Fe railroad bridge at San Francisco. Specifications for structural shapes have been only fair during the week and the mills are looking with less security upon their position as regards this product. Shapes are freely quoted at 1.38c., Chicago, and in a number of cases have gone \$2 a ton or more below this. We quote for Chicago delivery, from mill, 1.33c. to 1.38c.

For Chicago delivery out of store, we continue to quote, 1.75c.

Plates.—The mill situation has not improved as regards available tonnage. The Indiana Harbor mill is running at a moderate gait on single turn and the plate mills of the leading interest are operating at about 80 per cent. of capacity. The Illinois Central, in addition to 500 refrigerator cars ordered from the American Car & Foundry Company, is in the market for 3000 box cars. The Union Pacific has purchased 64 locomotives of various types. But instead of the 10,000 or 15,000 cars which are now in the market and are bringing out cost quotations, ten times this number is necessary to establish the mills on a good footing. Prices are unchanged and we quote for Chicago delivery, from mill, 1.33c. to 1.38c.

We quote for Chicago delivery from jobbers' stocks, 1.75c.

Sheets.—Irregularities in quotations show that the greater number of sheet mills are failing to secure as much business as they are able to handle. At the same time, the leading independent maker in this district is declining orders for earlier delivery than May. A feature of the specifications being offered is the general insistence upon the promptest possible shipment. This indicates a postponing of buying on the part of users until it can be delayed no longer. We quote for Chicago delivery from mill: No. 10 blue annealed, 1.63c.; No. 28 black, 2.13c. to 2.18c.; No. 28 galvanized, 3.13c. to 3.18c.

For sheets out of store we quote for Chicago delivery as follows, minimum prices applying on bundles of 25 or more: No. 10 blue annealed, 1.95c.; No. 28 black, 2.45c. to 2.55c.; No. 28 galvanized, 3.50c. to 3.60c.

Bars.—The wide variety of uses for bars and the fact that bars are but semi-finished forms for many mills, to be converted into more highly finished products, as spikes, bolts, etc., has served to hold merchant mill operations at a high rate. The call for reinforcing bars is also heavy and local capacity is well sold up to June 1. Bar-iron tonnage is light and prices are unchanged. We quote for mill shipments as follows: Bar iron, 1.15c. to 1.17½c.; soft steel bars, 1.38c.; hard steel bars, 1.30c.; shafting in carloads, 65 per cent. off; less than carloads, 60 per cent. off.

We quote store prices for Chicago delivery: Soft steel bars, 1.65c.; bar iron, 1.65c.; reinforcing bars, 1.65c. base, with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting 60 per cent. off.

Hoops and Bands.—Specifications against contracts for hoops and bands can hardly be called satisfactory in volume, but the mills apparently have enough business on hand to prevent any severe demoralization in prices. Concessions are not entirely lacking, but the market continues nominally on the basis of 1.38c., Chicago, for bands, with full standard classification extras, and for hoops, 1.48c.

Rivets and Bolts.—The past week shows no feature to mark the business in rivets and bolts as different from the long period of unproductive capacity. We quote from mill as follows: Carriage bolts up to $\frac{3}{4}$ x 6 in., rolled thread, 80-5; cut thread, 80; larger sizes, 75-5; machine bolts up to $\frac{3}{4}$ x 4 in., rolled thread, 80-10; cut thread, 80-5; larger sizes, 75-10; coach screws, 80-15; hot pressed nuts, square head, \$6.20 off per cwt.; hexagon, \$7 off per cwt. Structural rivets, $\frac{1}{2}$ to $1\frac{1}{4}$ in., 1.73c. to 1.78c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

We quote out of store: Structural rivets, 2.35c.; boiler rivets, 2.55c.; machine bolts up to $\frac{3}{4}$ x 4 in., 75-10; larger sizes, 70-10-5; carriage bolts up to $\frac{3}{4}$ x 6 in., 75-5; larger sizes, 70-10 off; hot pressed nuts, square head, \$6.00, and hexagon, \$6.70 off per cwt.

Wire Products.—The unusually advanced condition of the ground is taking the farmers to the field early and spring repairs are likely to be postponed for a time. Retail dealers in wire products are working with small stocks. Orders to jobbers and mills in consequence carry with them prompt delivery specifications. The wire mills are not running on as heavy schedules as might be expected at this time of the year. Prices are firm. We quote to jobbers as follows: Plain wire No. 9 and coarser, base, \$1.58; wire nails, \$1.78; painted barb wire, \$1.78; galvanized, \$2.18; polished staples, \$1.78; galvanized, \$2.13, all Chicago.

Old Material.—The last traces of the recent price ascension in scrap have been liquidated and quotations are again on the low basis which preceded that advance. One of the unusual features attending the present low level of prices is the extent to which dealers have obligated themselves for tonnage on short orders. A covering of these orders, attended by an advance in quotations, seems to be an unavoidable sequence. However, the railroads are again offering a liberal tonnage this week, all of which, aggregating 17,000 tons, will undoubtedly be taken by the dealers and brokers. The Rock Island has 3600 tons, the Great Northern 5700 tons, the Soo line 1500 tons, the Northern Pacific 800 tons, the Chicago, Burlington & Quincy 2000 tons, the Chicago & Alton 700 tons and the Santa Fe 3000 tons. This latter road is understood to have greatly reduced the total of its scrap accumulation so that this is no longer a menace to this market. The Great Northern includes 750 tons of iron rails on its scrap list. We have revised our quotations in keeping with this decline. We quote, for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Old iron rails	\$12.75 to \$13.25
Old steel rails, rerolling	11.50 to 12.00
Old steel rails, less than 3 ft.	10.75 to 11.25
Relaying rails, standard section, subject to inspection	24.00
Old carwheels	11.75 to 12.25
Heavy melting steel scrap	9.75 to 10.00
Frogs, switches and guards, cut apart	9.75 to 10.00
Shoveling steel	9.00 to 9.25
Steel axle turnings	6.75 to 7.25
Per Net Ton	
Iron angles and splice bars	\$12.25 to \$12.75
Iron arch bars and transoms	12.25 to 12.75
Steel angle bars	9.00 to 9.50
Iron car axles	17.50 to 18.00
Steel car axles	12.50 to 13.00
No. 1 railroad wrought	8.75 to 9.25
No. 2 railroad wrought	8.00 to 8.50
Cut forge	8.00 to 8.50
Steel knuckles and couplers	9.00 to 9.50
Steel springs	9.75 to 10.25
Locomotive tires, smooth	10.00 to 10.50
Machine shop turnings	4.75 to 5.25
Cast borings	4.50 to 5.00
No. 1 busheling	7.50 to 8.00
No. 2 busheling	6.00 to 6.50
No. 1 boilers, cut to sheets and rings	6.50 to 7.00
Boiler punchings	9.25 to 9.75
No. 1 cast scrap	10.25 to 10.75
Stove plate and light cast scrap	9.25 to 9.75
Grate bars	9.00 to 9.50
Railroad malleable	9.00 to 9.50
Agricultural malleable	8.25 to 8.75
Pipes and flues	6.75 to 7.25

Cast-Iron Pipe.—The award of 10,000 tons of pipe, for which bids were received at Detroit, has not been made as yet, though the Detroit shop of the American Car & Foundry Company is the low bidder. About 600 tons of pipe was bought at Waterloo, Iowa, and about 350 tons at Princeville, Wis. Sales of gas pipe during the week totaled 1000 tons. We quote as follows, per net ton, Chicago: Water pipe, 4 in., \$26; 6 to 12 in., \$24; 16 in. and up, \$23.50, with \$1 extra for gas pipe.

Philadelphia

PHILADELPHIA, Pa., March 24, 1914.

In nearly all materials and products the market is passive to a great extent. In pig iron there has been exceptional quiet. Sellers maintain that pig-iron prices are holding up in a satisfactory manner and say it is the one pleasing phase of the situation in view of their belief that iron has sold too low of late. Billets have continued fairly active and sheets are being specified to a comfortable extent, though not far ahead. Finished products, such as bars, plates and structural material, are soft, but with hardly enough inquiry to develop the actual level of prices. In most cases, however, desirable offerings would elicit recessions in price.

Iron Ore.—There is but little interest and not much is expected until the Lake ore prices have been established. In the week ended March 21 importations consisted of 11,997 tons from Sweden.

Pig Iron.—The general tenor of the market is exceptionally quiet, though a small minority of sellers express themselves as satisfied with the routine demand for pipe and foundry grades. Others say that the one satisfactory feature of the market to them is that prices are holding fairly steady despite the dullness. The assertion is repeatedly made that pig iron has been sold too cheap. Quotations are still \$15 to \$15.25 for standard brands of eastern Pennsylvania No. 2X for early and second quarter delivery, with a few sales up to \$15.50 for delivery up to the end of the first half. Deliveries are on the whole at a good rate, though a few requests for postponements have come to light. Gray forge has shared the quietness, although one sale of a few thousand tons was made to a leading Eastern bar-iron maker at \$14. In basic some furnaces are oversold, but little is doing at the present time. The basic price ranges from \$14.25 to \$14.50, delivered. At a little under the last-named figure a sale of a round lot is reported but unconfirmed. Virginia iron is quiet and unchanged at \$12.75 furnace, or \$15.55 to \$15.75 for both No. 2X and No. 2 plain delivered here up to the end of the first half. A sale of a few hundred tons of Southern low-grade iron was made to a Western pipe maker on a basis of \$11, Birmingham. Some fairly good contracts recently booked by Delaware River pipe makers will be reflected in the pig-iron market. There arrived at this port last week an importation of 100 tons of Swedish pig iron. Standard low phosphorus has been sold at \$21 delivered, with other transactions for a copper-bearing low-phosphorus iron at \$17.50, furnace. The following range of prices about represents the market for near future delivery in buyers' yards in this district:

Eastern Penna. No. 2 X foundry	\$15.00 to \$15.25
Eastern Penna. No. 2 plain	14.75 to 15.00
Virginia No. 2 X foundry	15.55 to 15.75
Virginia No. 2 plain	15.55 to 15.75
Gray forge	14.00 to 14.25
Basic	14.25 to 14.50
Standard low phosphorus	21.00

Ferroalloys.—One or two small inquiries are before the trade but even these are slow in closing. For English 80 per cent. ferromanganese dealers continue to quote \$39, seaboard, and for German, \$38, seaboard. The reports of offerings down to \$37 do not seem to be regarded with great seriousness, the belief being that if they exist they represent only small resale lots. It is known that a market for imported 50 per cent. ferrosilicon is being sought, but not much can be definitely learned. The domestic 50 per cent. product is

unchanged at \$71 to \$73, Pittsburgh, according to quantity, with 11 per cent. at \$24.30, delivered.

Cast-Iron Pipe.—Local cast-iron pipe makers see a good outlook, the volume of inquiries having increased over that of two or three weeks ago. The quotation for 6-in. pipe at the Delaware River foundries, per net ton, standard weight, in carload lots, is \$21.50, with 4-in. pipe \$2 higher and larger sizes 50c. less.

Billets.—Specifications are fair and the market shows no change. Second quarter business should come out in greater volume very soon. Quotations for open-hearth rolling billets stand at \$23.40 to \$24.40, delivered, with forging steel quoted at the usual \$4 to \$5 per ton advance over rolling billets.

Plates.—With a continuance of specifying that only keeps pace with current needs, some makers are operating to a fairly good percentage of capacity on miscellaneous orders, but they admit disappointment with the character of business that prevails with spring so near at hand. Business is being taken at 1.35c., delivered, for carloads, 1.38c., for part carloads, and forward at 1.40c. Other mills are not so active and the prices named could be shaded on desirable transactions, 1.32½c., delivered, being obtained with relative ease.

Structural Material.—Small propositions which do not command the attention of the larger interests are about all there is in this vicinity to occupy the trade. Among these may be mentioned a new building here for the Board of Home Missions of the Methodist Episcopal Church, involving between 200 and 300 tons, and an inquiry for 100 tons of shapes required by the William Cramp & Sons Ship & Engine Building Company. The quotation ostensibly is 1.35c., delivered, but the market is soft and offerings would probably bring out lower prices, a condition which sellers admit, for the reason that the mills are hungry for orders. Some of them are operating at 50 per cent. or less of capacity.

Bars.—There has been some shading, and in iron bars 1.22½c., delivered, can be done in some quarters, with other sellers adhering to 1.25c. to 1.27½c., delivered here. With the passing of winter weather steel bars will feel the greater demand incidental to the larger volume of concrete work. Sellers describe the market as reasonably firm at 1.20c., Pittsburgh, or 1.35c., Philadelphia.

Sheets.—The mills continue to run fairly full, with assurances as to future business not as satisfying as they should be. No. 10 blue annealed sheets are quoted at 1.55c. to 1.60c., delivered.

Old Material.—It is authoritatively stated that the sale of 10,000 to 15,000 tons of No. 1 heavy melting steel, reported a week ago, was at \$11.50 instead of \$11.30, as mentioned. Since that time two good sales of heavy melting steel have been made at \$11.50, but this price has weakened and better could probably be done. Inquiry is lacking and the attitude of both buyers and sellers is one of waiting. The following quotations about represent the market for deliveries in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates varying from 35c. to \$1.35 per gross ton:

No. 1 heavy melting steel.....	\$11.00 to \$11.50
Old steel rails, rerolling.....	13.00 to 13.50
Low phosphorus heavy melting steel scrap (nominal).....	14.50 to 15.00
Old steel axles (nominal).....	15.50 to 16.00
Old iron axles.....	21.00 to 22.00
Old iron rails.....	16.50 to 17.00
Old carwheels.....	12.25 to 12.75
No. 1 railroad wrought.....	13.50 to 14.00
Wrought-iron pipe.....	10.50 to 11.00
No. 1 forge fire.....	9.00 to 9.50
Bundled sheets.....	9.00 to 9.50
No. 2 light iron (nominal).....	5.00
No. 2 bushelling (nominal).....	8.00 to 8.50
Wrought turnings.....	8.50 to 8.75
Cast borings.....	8.75 to 9.25
Machinery cast.....	13.00 to 13.50
Grate bars, railroad.....	9.00 to 9.50
Stove plate.....	9.50 to 10.00
Railroad malleable (nominal).....	9.50 to 10.00

Coke.—The demand is routine at unchanged quotations. For prompt shipment Connellsville furnace coke, \$1.90 to \$2 per net ton at oven is quoted, with contract coke at \$2. Connellsville foundry coke is quoted at \$2.50 to \$2.75, at oven, per net ton, with some grades selling at \$2.85. Freight rates from the producing districts are as follows: Connellsville, \$2.05; Mountain, \$1.65, and Latrobe, \$1.85.

Oliver Gee and S. C. Ludwig have opened an office in the Harrison Building, Philadelphia, under the firm name of Gee & Ludwig Company for the sale of pig iron, coke, coal and iron and steel products generally. Mr. Gee was with George F. Barnes & Co. for 14 years and for the past 11 years with Matthew Addy & Co. Mr. Ludwig was with the Alan Wood Iron & Steel Company for 11 years and for nearly four years past with Matthew Addy & Co.

Boston

BOSTON, MASS., March 24, 1914.

Old Material.—Everyone is playing a waiting game, according to the dealers. The latter are not pushing for sales at prevailing prices, for if they reduce stocks they cannot replace them at a profit. Consumers are apparently buying only to meet immediate requirements. The market is a little weaker, but prices have not been reduced. The quotations given below are based on prices offered by the large dealers to the producers and to the small dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points which take Boston rates from eastern Pennsylvania points. In comparison with Philadelphia prices the differential for freight of \$2.30 a ton is included. Mill prices are approximately 50c. a ton more than dealers' prices:

Heavy melting steel.....	\$8.75 to \$9.00
Low phosphorus steel.....	13.75 to 14.75
Old steel axles.....	13.25 to 13.75
Old iron axles.....	21.25 to 21.75
Mixed shafting.....	12.75 to 13.00
No. 1 wrought and soft steel.....	9.00 to 9.25
Skeleton (bundled).....	6.00 to 6.50
Wrought-iron pipe.....	8.25 to 8.50
Cotton ties (bundled).....	7.25 to 7.75
No. 2 light.....	3.75 to 4.25
Wrought turnings.....	5.50 to 6.00
Cast borings.....	5.75 to 6.25
Machinery, cast.....	11.25 to 11.50
Malleable.....	8.00 to 8.25
Stove plate.....	7.75 to 8.00
Grate bars.....	6.25 to 6.50
Cast-iron carwheels.....	11.00 to 11.25

Cincinnati

CINCINNATI, OHIO, March 25, 1914.—(By Wire.)

Pig Iron.—Buyers are not even taking a lukewarm interest in the market, and as a consequence there is a dearth of inquiries. Practically all consumers are well supplied for the second quarter, although there is some small business that will have to come out from under cover in a short time. At present there are no signs indicating a revival of the inquiry for last half shipment, and the furnace operators, both North and South, appear to remain content until there is a change. Only a small tonnage of Northern foundry iron has been sold at the advanced price of \$13.50, Iron-ton, representing a few carloads that customers in districts where freight rates were favorable took for urgent needs. Southern prices are unchanged, although there are indications that firm offers might shade the regular quotations. As a rule sellers are not trying to force the market and have called in their salesmen to await developments. The delayed buying for last half requirements, it is predicted, will bring about a sudden period of activity, during which a large tonnage of iron will change hands. Shipments on contracts are said to be satisfactory, and since the open weather has begun a few consumers have been taking more than their contracts called for. The 1200 tons of Northern foundry iron wanted in West Virginia was bought last week, and the small lot of high manganese asked for by an Illinois melter was also closed. A few small sales of both Northern and Southern iron were made in Indiana, but the total tonnage is limited. Based on freight rates of \$3.25 from Birmingham and \$1.20 from Iron-ton we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft.....	\$14.50 to \$15.00
Southern coke, No. 2 f'dry and 2 soft.....	14.00 to 14.50
Southern coke, No. 3 foundry.....	13.50 to 14.00
Southern No. 4 foundry.....	13.00 to 13.50
Southern gray forge.....	12.50 to 13.00
Ohio silvery, 8 per cent. silicon.....	17.20 to 17.70
Southern Ohio coke, No. 1.....	15.70 to 16.20
Southern Ohio coke, No. 2.....	14.70 to 15.20
Southern Ohio coke, No. 3.....	14.45 to 14.70
Southern Ohio malleable Bessemer.....	14.70 to 15.20
Basic, Northern.....	14.70 to 15.20
Lake Superior charcoal.....	16.25 to 17.25
Standard Southern carwheel.....	27.25 to 27.75

(By Mail)

Coke.—The market has not lost ground as far as prices are concerned, although there is practically no new business being transacted in either furnace or foundry grades. The foundries are moving up in taking care of shipments on their contracts, but there is still considerable complaint as to the inability of quite a number to consume all the coke previously ordered. In some instances this is said to have caused the sale of a small tonnage of foundry coke, already loaded on cars, at a figure a little below the regular prompt shipment quotation. This condition seems to have existed in the Connellsville more than in the Wise County and Pocahontas districts. Our quotations are unchanged at \$1.90 per net ton at oven for prompt Connellsville 48-hr. grades, with 10c. a ton added on contract business. In some instances this advance is doubled for fancy brands. Foundry coke is quotable around \$2.50 to \$2.75 per net ton at oven. Wise County and Pocahontas operators are asking from 10c. to 20c. a ton over the prices mentioned.

Finished Material.—Considerable improvement is noted in shipments on all kinds of finished products. Sheet makers state that new business is holding up fairly well and they expect a busy spring. With the exception of reinforcing concrete bars other lines have not fared quite so well. Building operations are slow in starting up, but there is a great deal of business in sight that will doubtless come to a head in the next 30 days. We quote No. 28 black sheets at 2.15c., f.o.b. cars Cincinnati or Newport, Ky., and galvanized sheets at 3.15c. Store prices on steel bars are from 1.75c. to 1.80c. and on small structural shapes 1.85c. Very little railroad track material is being purchased in this territory.

Old Material.—The scrap-iron merchants are taking in bargain lots of old material, but are not disposed to pay market prices. The majority are well stocked with a full line of all grades, and there is a tendency to await developments in pig iron before making any large purchases. This condition practically exists with the consumers, and as a consequence the market is very dull. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices, f.o.b. at yards:

Per Gross Ton

Bundled sheet scrap	\$7.25 to	\$7.75
Old iron rails	12.25 to	12.75
Relaying rails, 50 lb. and up.....	20.25 to	20.75
Re-rolling steel rails	11.25 to	11.75
Melting steel rails	9.75 to	10.25
Old carwheels	10.75 to	11.25

Per Net Ton

No. 1 railroad wrought	\$9.25 to	\$9.75
Cast borings	5.00 to	5.50
Steel turnings	5.00 to	5.75
No. 1 cast scrap	9.75 to	10.25
Burnt scrap	6.50 to	7.25
Old iron axles	17.25 to	17.75
Locomotive tires (smooth inside)....	10.25 to	10.75
Pipes and flues	6.75 to	7.25
Malleable and steel scrap	7.75 to	8.25
Railroad tank and sheet scrap.....	5.75 to	6.25

Birmingham

BIRMINGHAM, ALA., March 23, 1914.

Pig Iron.—The market is stagnant. There is a dearth of inquiry and trading is on a small scale. One company's week's business amounted to 700 tons, sold in small lots at from \$11 to \$11.25. The usual quotations continue to be \$11 for spot and \$11.25 for the third quarter and second half, but offers of \$11 for these latter periods would doubtless be accepted. In fact, the iron that has sold above \$11, either for spot or future delivery, has been metal preferred by the buyer to other irons made in the South. For competitive territory \$10.75 can be done, and it is not improbable that larger orders for Southern delivery could be booked at that figure. Some makers call it a waiting period, while others charge it up to the prevailing dullness in the foundry trades and in other lines of consumption. Shipments, on the other hand, are ordered out promptly, the record of the Alabama Car Service Association showing heavy movements, the number of freight cars handled in February being an

increase over January, although the month was three days shorter. The use of steel-making irons is increasing, and the improvement in the steel trades in this district suggests a steady demand for basic for some time to come. It seems safe to predict continuous operation at steel mills. There is no improvement in the heavy machinery and foundry trade, which means a curtailment of the home demand for Southern iron. We quote, per gross ton, f.o.b. furnaces, as follows:

No. 1 foundry and soft.....	\$11.25 to	\$11.50
No. 2 foundry and soft.....	10.75 to	11.00
No. 3 foundry	10.25 to	10.50
No. 4 foundry	10.00 to	10.25
Gray forge	9.75 to	10.00
Basic	10.50 to	11.00
Charcoal	23.50 to	24.00

Cast-Iron Pipe.—Manufacturers of soil pipe are operating to capacity and report a spring trade fully equal to the average, while the large volume of structural operations announced in the South suggests the continuance of these conditions. Water and gas pipe factories report no change. Operations are normal, but prices are fluctuating. We quote, per net ton, f.o.b. makers' yards, as follows: 4-in., \$21; 6-in. and upward, \$19. Gas pipe is held at \$1 per ton higher.

Coal and Coke.—The coal market has improved. Recent cold weather served to minimize stocks and create a new demand. Prevailing prices are \$1.75 for steam, \$1.20 for run of mine and \$2 to \$2.50 for domestic at the mines. Coke is stronger and in better demand, although prices have not changed. The freight rate to California has been reduced from \$10 to \$9 and a revival of Pacific coast business is expected as the result. We quote, per net ton, f.o.b. oven, as follows: Furnace coke, \$2.50 to \$2.80; foundry, \$3.25 to \$3.60.

Old Material.—The week has been quiet, with no change in prices. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old iron axles	\$14.50 to	\$15.00
Old steel axles	14.50 to	15.00
Old iron rails	13.00 to	13.50
No. 1 railroad wrought	10.00 to	11.00
No. 2 railroad wrought	8.50 to	9.00
No. 1 country wrought	9.00 to	10.00
No. 2 country wrought	8.00 to	9.00
No. 1 machinery cast	9.50 to	10.00
No. 1 steel scrap	8.00 to	8.50
Tram carwheels	9.50 to	10.00
Standard carwheels	10.50 to	11.00
Stove plate	8.00 to	8.50

Cleveland

CLEVELAND, OHIO, March 24, 1914.

Iron Ore.—Aside from a few reservations previously reported, the ore market shows no indications of life, and the uncertainty regarding the season's prices continues. Dock shipments have improved somewhat, but are light for the season. Conditions indicate a late opening of navigation. It is probable that no ore will be shipped before May. We quote 1913 prices as follows: Old range Bessemer, \$4.40; Mesaba Bessemer, \$4.15; old range non-Bessemer, \$3.50; Mesaba non-Bessemer, \$3.40.

Pig Iron.—With the exception of a few car lots of foundry iron, no sales are reported and there are no new inquiries. A Pittsburgh sanitary interest recently quietly purchased from a Valley furnace 1000 tons of foundry iron for the second quarter at \$13.25 and a Wheeling sanitary company has closed for 500 tons. A local selling agency has sold several lots of Southern charcoal iron aggregating 1500 tons in Pittsburgh for delivery over the remainder of the year at \$24, Birmingham. Local prices are firmly maintained at \$14, in spite of the dullness. While there are occasional orders to hold up shipments, most consumers want prompt delivery of the iron, indicating that they have not bought in greater amounts than their present requirements. We quote delivered Cleveland as follows:

Bessemer	\$15.15
Basic	14.00
Northern No. 2 foundry	14.25
Southern No. 2 foundry	\$15.10 to 15.35
Gray forge	13.50
Jackson Co. silvery, 8 per cent. silicon	17.55

Coke.—The market is dull. Most consumers of foundry coke are under contract and those who are not are buying small lots for prompt shipment as needed. We quote Standard Connellsville foundry coke at \$2.40 to \$2.75 per net ton. Standard furnace coke is firm at \$2 for prompt shipment, but some makes can be had at lower prices.

Finished Iron and Steel.—A few bright spots have appeared in the market, but generally the demand continues dull. Plate business has improved somewhat in orders from car lots to 100 tons. There is a better demand from boiler and tank makers. A local plate mill reports a better volume of business than for February and is booking orders at about 75 per cent. capacity. While sales of 100-ton lots are being made at 1.20c., round lot orders would probably bring out a 1.15c. price. Prices on steel bars and structural material are being well maintained at 1.20c. to 1.25c. with no round lot inquiries to test the market. Present indications are that second quarter contracts made at the 1.25c. price will have to be readjusted at 1.20c. Some prospective business has been held up, including a 900-ton plate inquiry from the Standard Oil Company. Railroad orders and specifications are generally being held back although a few roads are buying more freely than they were. A Cleveland contractor, who has taken the general contract for a new high school building in Washington, D. C., has placed the contract for the concrete work with the Hammett Fire Proofing Company of Washington. This will require 700 tons of bars. The structural work requiring 2000 tons has not yet been placed. Bar iron is dull and both Cleveland mills are shut down. We quote iron bars at 1.20c. Cleveland for outside shipment and 1.30c. for Cleveland delivery. Sheet sales are reported at 1.85c. for No. 28 black and 2.85c. for No. 28 galvanized, but most mills are asking \$1 a ton higher. We quote stock prices at 1.80c. for steel bars, 1.75c. for iron bars and 1.90c. for plates and structural material.

Bolts and Rivets.—While the market is not active, prices are being well maintained by the leading bolt makers. Most consumers are now under contract for the second quarter. Rivet prices are unchanged at 1.65c. for structural and 1.75c. for boiler and round lots. We quote discounts as follows: Common carriage bolts, $\frac{3}{4}$ x 6 in. smaller or shorter, rolled thread, 80 and 5 per cent.; cut thread, 80 per cent.; larger or longer, 75 and 5 per cent.; machine bolts with h.p. nuts, $\frac{3}{4}$ x 4 in., smaller or shorter, rolled thread, 80 and 10 per cent.; cut thread, 80 and 5 per cent.; larger or longer, 75 and 10 per cent.; coach and lag screws, 80 and 15 per cent.; square h.p. nuts, blank or tapped, \$6.30 off; hexagon h.p. nuts, blank or tapped, \$7.20 off; c. p. c. and t. square nuts, blank or tapped, \$6 off; hexagon, $\frac{3}{4}$ in. and larger, \$7.20 off; 9/16 in. and smaller, \$7.80 off; semi-finished hexagon nuts, $\frac{3}{4}$ in. and larger, 85, 10 and 5 per cent.; 9/16 in. and smaller, 85, 10, 10 and 5 per cent.

Old Material.—With improved weather conditions dealers are crowding the mills with shipments on recent orders. An embargo has been declared against the Upson Nut Company because of its inability to handle scrap already shipped. Consumers are well supplied with material and few care to purchase additional at present, regardless of low prices. Trading is confined to dealers and few transactions are reported. The market is weak and prices on several grades have declined. Borings are a drug on the market and are particularly weak. Some railroad wrought has been bought by a local mill at less than \$10.50. We quote f.o.b. Cleveland as follows:

Per Gross Ton	
Old steel rails, rerolling.....	\$11.50 to \$12.00
Old iron rails	13.50 to 14.00
Steel car axles	15.00 to 15.25
Heavy melting steel	10.50 to 11.00
Old carwheels	11.50 to 12.00
Relaying rails, 50 lb. and over.....	23.00 to 25.00
Agricultural malleable	9.00 to 9.50
Railroad malleable	10.75 to 11.00
Light bundled sheet scrap.....	7.50 to 8.00
Per Net Ton	
Iron car axles	\$19.00 to \$20.00
Cast borings	5.75 to 6.00
Iron and steel turnings and drillings.....	5.50 to 5.75
Steel axle turnings	6.75 to 7.25
No. 1 busheling, new.....	8.75 to 9.00
No. 1 busheling, old.....	8.00 to 8.25
No. 1 railroad wrought	10.00 to 10.50
No. 1 cast	10.75 to 11.00
Stove plate	8.75 to 9.00

Buffalo

BUFFALO, N. Y., March 24, 1914.

Pig Iron.—Although the market is exceedingly dull and devoid of special features, new orders to the extent of 14,000 tons were placed in the week. Only a small amount of new inquiry is developing, and apparently very little interest is manifested just at present on the part of either buyers or sellers. Ten of the 11 furnaces of the district are now in blast; most furnace companies being well booked with orders up to the end of the second quarter. A few foundries are showing considerable urgency as to shipments on contracts; but the majority of the melters of the district report more or less pronounced slackness in current work. This depression is thought to be only temporary, however, and it is hoped improvement in general business will soon set in, creating renewed demand. Notwithstanding the dullness now observable, prices are being firmly held by producers and furnacemen are unwilling to consider last half business at present. We quote as follows for prompt and second quarter delivery, f.o.b. Buffalo:

No. 1 foundry	\$13.75 to \$14.25
No. 2 X foundry	13.50 to 14.00
No. 2 plain	13.25 to 13.75
No. 3 foundry	13.00 to 13.25
Gray forge	12.75 to 13.25
Malleable	13.75 to 14.00
Basic	13.75 to 14.00
Charcoal	15.75 to 16.75

Finished Iron and Steel.—Business in practically all lines is quiet, with very little new buying. Specifications against contracts that were closed in January continue in fair volume. Inquiry has increased slightly, but for small amounts only. The price situation is unchanged and will remain unchanged until next week at least, when it will be determined by the mills whether or not they will continue to ask the advance of \$1 per ton over present current quotations on material for delivery over second quarter. One order of five carloads of wire products is reported for the week. The Lackawanna Steel Company has secured the contract for the 1500 tons of sheet piling for Toronto harbor. The Cambria Steel Company has 140 tons of reinforcing bars for the New York State Railways at Syracuse. The Buffalo Structural Steel Company has taken 550 tons of structural steel for the Pratt & Letchworth Company, Buffalo; also 100 tons for a store and office building for Joseph Block, this city. In connection with the Canadian trade situation a great deal of interest is displayed over the annual budget of the finance minister and over the outcome of the meeting held at the King Edward Hotel, last week, called by the two wire rod manufacturers of Canada—the Steel Company of Canada, Hamilton, and the Dominion Iron & Steel Company, Sydney, N. S. To this meeting were invited the users of rods, to ascertain if they could not get together and urge the Government to put a duty on imported rods, the rod manufacturers agreeing to use their influence in turn to have a duty put upon fence wire which now goes into Canada from the United States free and which amounts to a good sized tonnage annually.

Old Material.—The market is still very quiet, with a tendency toward lower prices. The sales made in the week were of small calibre. There appears to be an undercurrent of feeling among the dealers, however, that there will be increased buying early in the coming quarter. Prices for a number of commodities have sagged, as shown by the schedule below, which covers gross ton prices, f.o.b. Buffalo:

Heavy melting steel	\$10.00 to \$10.50
Low phosphorus steel	15.00 to 15.50
Boiler plate sheared	11.50 to 12.00
No. 1 railroad wrought scrap.....	11.00 to 11.50
No. 1 railroad and machinery cast scrap	12.00 to 12.50
Old steel axles	15.00 to 15.50
Old iron axles	21.50 to 22.00
Old carwheels	12.00 to 12.50
Railroad malleable	10.75 to 11.25
Machine shop turnings	5.50 to 6.00
Heavy axle turnings	7.75 to 8.50
Clean cast borings	6.00 to 6.50
Old iron rails	16.00 to 16.50
Locomotive grate bars	9.50 to 10.00
Stove plate (net tons).....	9.75 to 10.00
Wrought pipe	7.50 to 8.00
Bundled sheet scrap	6.25 to 6.50
No. 1 busheling scrap.....	8.50 to 9.00
No. 2 busheling scrap.....	6.00 to 6.50

St. Louis

ST. LOUIS, Mo., March 23, 1914.

Pig Iron.—With furnaces holding firm in prices and with consumers bought ahead fully for the first half this market is for the most part marking time. The only sale of moment was 1500 tons of Northern iron and the only inquiry remaining unfilled is for 400 tons in four lots of different grades. Melters, however, are taking their allotments, which indicates that the iron is going into consumption. The spread of \$10.50 to \$11.50 for No. 2 Southern, Birmingham basis, continues while Ohio iron is \$13.25 to \$13.50, Iron-ton basis, and No. 2 Chicago \$14.00 to \$14.50.

Coke.—There has been some slackening in price stiffness, but no transactions of consequence. There are no inquiries in the market, but the usual 50,000 tons for Great Western Sugar beet sugar plants will be due shortly.

Finished Iron and Steel.—There is a steady flow of shipments under contract. Reinforcing bars are in active demand, but the implement houses are at present working off excess bar stock from last season. The vehicle interests are taking freely. In standard section steel rails the only sale was of 6000 tons to the Frisco receivers. Light rails are moving slowly and track fastenings are in demand only for actual needs. A hotel at Kansas City is reported about ready to close with requirements of about 2200 tons of structural material.

Old Material.—The scrap market is sagging heavily. Consuming interests are taking only for immediate melting and there is a feeling that there will be no improvement in the market until the railroad rate question is settled. Lists out include one from the Chicago, Burlington & Quincy of about 2500 tons and one from the Northern Pacific of about 1100 tons. Relaying rails are still slow at quotations. We quote dealers' prices f.o.b. St. Louis as follows:

Per Gross Ton		
Old iron rails	.....	\$11.50 to \$12.00
Old steel rails, rerolling	.....	11.75 to 12.25
Old steel rails, less than 3 feet	.....	10.50 to 11.00
Relaying rails, standard section, subject to inspection	.....	22.00 to 24.00
Old carwheels	.....	10.50 to 11.00
No. 1 railroad heavy melting steel scrap	.....	10.50 to 11.00
Shoveling steel	.....	9.00 to 9.50
Frogs, switches and guards cut apart	.....	10.50 to 11.00
Bundled sheet scrap	.....	4.50 to 5.00

Per Net Ton		
Iron angle bars	.....	\$11.00 to \$11.50
Steel angle bars	.....	9.25 to 9.75
Iron car axles	.....	17.50 to 18.00
Steel car axles	.....	12.50 to 13.00
Wrought arch bars and transoms	.....	12.00 to 12.50
No. 1 railroad wrought	.....	8.50 to 9.00
No. 2 railroad wrought	.....	8.25 to 8.75
Railroad springs	.....	9.25 to 9.75
Steel couplers and knuckles	.....	9.00 to 9.50
Locomotive tires, 42 in. and over, smooth	.....	9.50 to 10.00
No. 1 dealers' forge	.....	8.00 to 8.50
Mixed borings	.....	4.00 to 4.50
No. 1 busheling	.....	8.00 to 8.50
No. 1 boilers, cut to sheets and rings	.....	6.25 to 6.75
No. 1 cast scrap	.....	10.00 to 10.50
Stove plate and light cast scrap	.....	8.50 to 9.00
Railroad malleable	.....	8.25 to 8.75
Agricultural malleable	.....	7.75 to 8.25
Pipes and flues	.....	6.25 to 6.75
Railroad sheet and tank scrap	.....	6.50 to 7.00
Railroad grate bars	.....	7.50 to 8.00
Machine shop turnings	.....	5.00 to 5.50

New York

NEW YORK, March 25, 1914.

Pig Iron.—Demand for pig iron shows no improvement. There is an almost entire absence of interest on the part of foundry buyers. Machinery foundries are not increasing their melt with the approach of spring; in some cases there seems to be a falling off and pig iron producers are hearing from this in the holding up of shipments. In view of the effort of furnace companies to get at least a profitable price as against sales at a loss made around the opening of the year, consumers are inclined to use up their low priced iron before making any new commitments. The market is

weak, but transactions are so few that it would be hard to say just what could be done on a fair sized inquiry. Cast-iron pipe is about the only foundry line in which there is activity worthy of the name. We quote Northern iron for tidewater delivery as follows: No. 1 foundry, \$15.25 to \$15.50; No. 2 X, \$14.75 to \$15.25; No. 2 plain, \$14.50 to \$14.75. Southern iron is on the basis of \$15.25 to \$15.75 for No. 1 and \$15 to \$15.25 for No. 2.

Finished Iron and Steel.—The finished material trade is concerned not alone with the aggravated dullness but with the prices at which the relatively small amount of business is going, representing figures close to, if not in some cases, below cost. The negative influences are accentuated by the decision of the New York Central not to buy cars at this time, although purchases of a few thousand cars were confidently expected. This follows the sale a week or so ago of 1000 or more tons of plates at below 1.10c., Pittsburgh. Chief interest is centered in the 50,000 tons for the Interborough third tracking, which business it is expected will be widely distributed, and in the 15,000 tons for an elevated section of the new subway system reported taken by Milliken Brothers. Some of the latest work coming into the market includes the Alt loft, West Forty-eighth street, about 600 tons; the Backer loft, West Thirty-first street, 900 tons, and further work for the New York subway systems, including 9400 tons on which bids will be taken March 27; 4800 tons on which bids will be taken April 14, and an additional section April 17. The Chicago & Northwestern is enquiring for 2000 steel upper and under frame box cars; the Great Northern for 1000 wooden refrigerator cars, and the St. Louis, Brownsville & Mexico for 200 box, 200 stock and 30 tank cars and 10 cabooses. Some of the contract awards are as follows: 300 tons for the Federal baseball field, Brooklyn, to the National Bridge Works; 200 tons for a garage on East Seventy-seventh street, to the George A. Just Company; 300 tons for a bridge for the Chesapeake & Ohio, to the McClintic-Marshall Company; 250 tons for the New York Central at Kingsbridge, to the American Bridge Company, and 300 tons for the Boston & Maine, to the Boston Bridge Works. We quote mill shipments of plates and structural material at 1.15c. to 1.20c., Pittsburgh, or 1.31c. to 1.36c., New York; steel bars at 1.20c. to 1.25c., Pittsburgh; iron bars, 1.27½c. to 1.35c., New York. We quote iron and steel bars from store at 1.90c. to 1.95c. and shapes and plates, 1.95c. to 2c.

Ferroalloys.—Representatives of English producers of 80 per cent. ferromanganese here continue to quote \$39, seaboard, though the amount of business is hardly enough to test the market. A few carloads are being sold at that price and there is an inquiry before the market for 200 to 300 tons. The German product is said to be obtainable at \$38, seaboard. Business in 50 per cent. ferrosilicon is normal, with occasional sales of carload and small lots at the regular quotations of \$73, Pittsburgh, for carloads; \$72 for 100 tons and \$71 for 600 tons and over.

Cast-Iron Pipe.—Fall River, Mass., will open bids March 30 on 680 tons of 6 to 12-in.; Springfield, Mass., March 31 on 1500 tons of 8 to 16-in.; Cleveland, Ohio, April 2 on about 1000 tons. The city of Rochester, N. Y., awarded the contract for 8700 tons of 37-in. pipe and 130 tons of special castings to the United States Cast Iron Pipe & Foundry Company at \$21.90 per net ton, delivered, for the pipe and \$55 per ton for the castings, and a contract for 1200 tons of 6 to 16-in. pipe at \$22, delivered, and 255 tons of 36-in. at \$21.89, delivered, to R. D. Wood & Co. Private buying has picked up considerably and the past week developed a considerable volume of business of this character. Competition for sizeable orders is sharp, and low prices continue to be made. Carloads of 6-in. are selling at \$22 to \$23 per net ton, tidewater.

Old Material.—The market continues extremely quiet. Inquiries are almost entirely lacking. Dealers are only able by persistent effort to sell small quantities to rolling mills and foundries, consumers of steel scrap being apparently supplied for the present. Re-

jections of deliveries on contracts continue to be made quite freely. Dealers' quotations are as follows, per gross ton, New York:

Old girder and T rails for melting....	\$8.75 to	\$9.25
Heavy melting steel scrap.....	8.75 to	9.25
Relaying rails	21.50 to	22.00
Rerolling rails	11.00 to	11.50
Iron car axles.....	19.00 to	20.00
Steel car axles	13.00 to	13.50
No. 1 railroad wrought	11.00 to	11.50
Wrought-iron track scrap.....	9.75 to	10.25
No. 1 yard wrought, long.....	9.25 to	9.75
No. 1 yard wrought, short.....	8.75 to	9.25
Light iron	3.50 to	4.00
Cast borings	6.00 to	6.50
Wrought turnings	6.00 to	6.50
Wrought pipe	8.50 to	9.00
Carwheels	11.50 to	12.00
No. 1 heavy cast, broken up.....	11.50 to	12.00
Stove plate	8.50 to	9.00
Locomotive grate bars.....	7.00 to	7.50
Malleable cast	8.00 to	8.50

Milliken Brothers, Inc., have moved their offices, including the structural drafting department, to commodious quarters on the nineteenth floor of the Whitehall Building, 17 Battery Place, New York City.

The Hooper-Falkenau Engineering Company has moved to larger offices on the nineteenth floor of the Woolworth Building, New York City.

Payne Brothers, fabricators and dealers in structural steel, Newark, N. J., have withdrawn from business, sublet pending contracts and closed their shop.

Scotch Steel Pool Broken

Steel Plates Lower on Disruption of Scotch Association—Pig Iron Remarkably Firm

(By Cable)

LONDON, ENGLAND, March 25, 1914.

The Scotch Steel Makers' Association has broken up and ship plates have been sold at £6 (\$29.20) and less. The general steel trade is poor. Not much is moving in semi-finished steel, but the tone is slightly steadier. Pig iron is quiet but prices are remarkably firm considering adverse outside conditions. The market seems to be waiting for a lead to come from improved conditions in politics and finance. The tendency of Continental finished steel is toward weakness. Stocks of pig iron in Connal's stores are 125,479 gross tons, against 129,546 tons one week ago. We quote as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 13s. (\$3.16).

The following prices are per ton of 2240 lb.:

Cleveland pig-iron warrants (Tuesday), 50s. 8d. (\$12.32), against 50s. 5d. (\$12.26) one week ago.

No. 3 Cleveland pig iron, makers' price, f.o.b. Middlesbrough, 51s. (\$12.41), against 50s. 9d. (\$12.34) one week ago.

Hematite pig iron, f.o.b. Tees, 62s. (\$15.09).

Steel sheet bars (Welsh), delivered at works in Swansea Valley, £4 10s. (\$21.89).

Steel bars, export, f.o.b. Clyde, £6 (\$29.20).

Steel joists, 15-in., export, f.o.b. Hull or Grimsby, £5 15s. (\$27.98).

Steel ship plates, Scotch, delivered local yards, £5 17s. 6d. (\$28.59), against £6 17s. 6d. (\$33.46) one week ago.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £8 15s. (\$42.58).

Steel rails, export, f.o.b. works port, £5 15s. (\$27.98), against £5 17s. 6d. (\$28.59) one week ago.

The following prices are per export ton of 1015 kilos, equivalent to 2237.669 lb.:

German sheet bars, f.o.b. Antwerp, 81s. (\$19.70).

German 2-in. billets, f.o.b. Antwerp, 76s. (\$18.48).

German basic steel bars, f.o.b. Antwerp, £4 8s. to £4 9s. (\$21.41 to \$21.65).

German joists, f.o.b. Antwerp, £5 2s. to £5 5s. (\$24.82 to \$25.55).

Metal Market

NEW YORK, March 25, 1914.

The Week's Prices

Cents Per Pound for Early Delivery							
Copper, New York		Electro-lytic	Tin,	Lead		Spelter	
Mar.	Lake			New York	St. Louis	New York	St. Louis
19.....	14.87½	14.37½	38.10	4.00	3.87½	5.30	5.15
20.....	14.87½	14.37½	37.95	4.00	3.87½	5.27½	5.12½
21.....	14.87½	14.37½	38.05	4.00	3.87½	5.27½	5.12½
23.....	14.87½	14.37½	38.50	4.00	3.87½	5.27½	5.12½
24.....	14.87½	14.50	38.65	4.00	3.87½	5.27½	5.12½
25.....	14.87½	14.50	38.50	4.00	3.87½	5.27½	5.12½

Copper is higher but is not active. Tin is stronger since fair buying of futures last week. Lead is dull and has a weaker tendency. Spelter is quiet at slightly lower quotations. Antimony is unchanged.

New York

Copper.—Since the good buying which took place in the early part of last week demand has slackened and not much business has been done. Late on March 18 the price of electrolytic advanced ½c. to 14.37½c., cash, New York, the rise being caused by buying. Yesterday producers again advanced their quotations ½c., making the cash New York price 14.50c. This move appears to have been based on advances in Standard copper in London caused by bull influences. Comment that this last advance is hardly justified by actual business is much heard. The demand for finished brass and copper products cannot be called good and many of the mills are still running on a four or five day basis. Prime Lake, which is quoted nominally at 14.87½c., cash, cannot be had for April delivery. The most interesting feature in copper is the enormous rate at which exports continue, the total so far this month being 34,065 tons, which is at a rate of considerably over 40,000 tons a month. As to actual disposal of this copper there is much conjecture, some maintaining that it is not all going into immediate consumption or official warehouses. The prices in London to-day are £65 7s. 6d. for spot and £65 15s. for futures.

Tin.—In the latter part of last week there was a steady though moderate business in future delivery metal, with little doing in spot. On Saturday, usually an off day in the tin market, there was some dealing and more could have been done if dealers had been willing, but they evidently foresaw the higher price which was to come on Monday and stayed out of the market. This week the metal has been stagnant in all positions. There is plenty of tin here. The arrivals this month total 4046 tons and there is afloat 3597 tons. The London quotations to-day are £175 5s. for spot and £177 5s. for futures. The New York quotation to-day is 38.50c.

Lead.—An easier tone in London, where lead is to-day quoted at £19 7s. 6d., has made the market softer here. So far as trading is concerned it is excessively dull. All selling interests have metal to dispose of and some are willing to make concessions to prevent business from going to the leading interest, while others will not cut their price. The exports of lead, recently mentioned, have increased. Government figures show that there was exported from Atlantic ports in February 626 gross tons; in January 951 gross tons; while last week alone there was sent abroad 1800 tons. In considering these figures, however, it must be kept in mind that the Government does not differentiate between actual domestic lead and that which is bonded. The latter, however, is believed to be far below normal because of the trouble in Mexico. The New York quotation is unchanged at 4c., but St. Louis is lower at 3.87½c.

Spelter.—The market is dull and quotations are a little lower at 5.27½c., New York, and 5.12½c., St. Louis. It is pointed out that European stocks are on the increase and the foreign market is soft, but the margin between New York and London is still sufficient to prevent any really depressing effect on domestic prices.

Antimony.—This metal is dull and without change at 6.75c. to 7c. for Hallett's, 7.20c. to 7.25c. for Cookson's and 5.25c. to 6c. for Chinese and Hungarian brands.

Old Metals.—The market continues strong. Dealers' selling prices are unchanged as follows:

	Cents per lb.
Copper, heavy and crucible.....	13.75 to 14.00
Copper, heavy and wire.....	13.25 to 13.50
Copper, light and bottoms.....	12.75 to 13.00
Brass, heavy.....	9.00 to 9.25
Brass, light.....	7.75 to 8.00
Heavy machine composition.....	12.25 to 12.50
Clean brass turnings.....	8.75 to 9.00
Composition turnings.....	11.25 to 11.50
Lead, heavy.....	3.75
Lead, tea.....	3.50
Zinc, scrap.....	4.25

Chicago

MARCH 23.—Conditions have again taken a more favorable turn with respect to the non-ferrous metals and sentiment has added strength to quotations. More trading in copper is noted and a slight advance has been made in tin prices. We quote as follows: Casting copper, 14.50c.; Lake copper, 15c., for prompt shipment; small lots, $\frac{1}{4}$ c. to $\frac{1}{2}$ c. higher; pig tin, carloads, 39.25c.; lead, desilverized, 4c., and corrod-ing, 4.25c., for 50-ton lots; in carloads, 2 $\frac{1}{2}$ c. per 100 lb. higher; spelter, 5.20c.; Cookson's antimony, 9.50c.; other grades, 8c.; sheet zinc, \$7.00, f.o.b. La Salle or Peru, Ill., less 8 per cent. discount in carloads of 600-lb. casks. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 12c.; copper bottoms, 11c.; copper clips, 11.25c.; red brass, 11.25c.; yellow brass, 8.25c.; lead pipe, 3.50c.; zinc, 3.50c.; pewter, No. 1, 25c.; tin-foil, 28c.; block tin pipe, 31c.

St. Louis

MARCH 23.—The metal market has been rather slow the past week. Lead closed to-day at 3.90c.; spelter, 5.15c.; electrolytic copper, 14.85c.; Lake copper, 15.35c.; tin, 38.05c. to 38.22 $\frac{1}{2}$ c.; Cookson's antimony, 7.60c. In the Joplin ore market prices were maintained at about last week's level with a little better demand. The basis range for 60 per cent. zinc was \$36 to \$40.50 per ton, with the best price for choicest lots running to \$43. Calamine was rather quiet at \$19 to \$21 for 40 per cent., and up to \$25 for the best. Lead ore was quiet at \$50 for 80 per cent. The chief feature was the strengthening of second grade ores. We quote miscellaneous scrap metals as follows: Light brass, 6.50c.; heavy yellow brass, 8c.; heavy red brass and light copper, 10c.; heavy copper and copper wire, 12c.; zinc, 3.50c.; lead, 3.50c.; tea lead, 3c.; tinfoil, 30c.; pewter, 26c.

British Iron and Steel Exports

Iron and steel exports from Great Britain for the first two months of 1914 show an increase in tonnage but a decrease in value as compared with the same period in 1913. The total sent abroad in January and February, 1914, excluding iron ore and scrap, was 801,007 gross tons, against 786,218 tons to March 1, 1913, the increase being 14,789 tons. In values the decrease was £157,523. The total exports to March 1, 1914, were valued at £8,709,136 as compared with £8,866,659 for the first two months of 1913. Pig iron, including ferroalloys, shows a decrease in exports of 23,911 gross tons, the total to March 1, 1914, being 142,014 tons, against 165,925 tons. The exports of galvanized sheets were 23,909 gross tons greater to March 1, 1914, than for the first two months of 1913, being 145,222 tons as compared with 121,313 tons.

Imports of iron and steel, excluding iron ore and scrap, to March 1, 1914, were 360,523 gross tons, against 397,132 tons to March 1, 1913, a decrease of 36,609 tons. The values for these two periods were £2,384,354 and £2,683,229 respectively, a difference of £298,875.

The report that it has been decided to add spike and bolt works to the Ensley, Ala., plant of the Tennessee Coal, Iron & Railroad Company is incorrect. Such an addition was proposed some time ago, but no action has been taken in the matter.

Iron and Industrial Stocks

NEW YORK, March 25, 1914.

The stock market has been quite uniformly strong, the underlying influence being the rather confident belief that the Eastern railroad lines will be permitted to make some advance in freight rates. The strength has not been confined to railroad equipment stocks, but pervades the entire list, with the exception of a few stocks like those of the M. Rumely Company, which have declined because of special influences. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com., 12 $\frac{1}{2}$ -13	Pressed Stl., com., 43 $\frac{1}{4}$ -45
Allis-Chal., pref., 47	Pressed Stl., pref., 103 $\frac{1}{2}$ -104
Am. Can., com., 29 $\frac{1}{2}$ -31 $\frac{3}{4}$	Ry. Spring, com., 30 $\frac{1}{2}$ -31 $\frac{3}{4}$
Am. Can., pref., 92 $\frac{1}{8}$ -93	Ry. Spring, pref., 97
Am. Car & Fdy., com., 50 $\frac{1}{8}$ -52 $\frac{5}{8}$	Republic, com., 25 $\frac{1}{4}$ -26 $\frac{1}{4}$
Am. Car & Fdy., pref., 116-117	Republic, pref., 89-89 $\frac{1}{2}$
Am. Loco., com., 34 $\frac{1}{4}$ -35 $\frac{3}{4}$	Rumely Co., com., 9-14 $\frac{1}{2}$
Am. Loco., pref., 103-103 $\frac{1}{2}$	Rumely Co., pref., 25 $\frac{1}{2}$ -37 $\frac{1}{2}$
Am. Steel Fdries., 33 $\frac{3}{4}$ -34	Sloss, com., 30 $\frac{1}{4}$ -31 $\frac{1}{2}$
Bald. Loco., com., 50 $\frac{3}{4}$ -51 $\frac{1}{4}$	Pipe, com., 11 $\frac{1}{2}$ -12
Bald. Loco., pref., 108-108 $\frac{1}{2}$	Pipe, pref., 42 $\frac{1}{4}$
Beth. Steel, com., 42 $\frac{1}{4}$ -44 $\frac{1}{2}$	U. S. Steel, com., 63 $\frac{1}{2}$ -65 $\frac{1}{4}$
Beth. Steel, pref., 84-85 $\frac{1}{2}$	U. S. Steel, pref., 109 $\frac{1}{2}$ -110 $\frac{1}{2}$
Case (J. I.), pref., 87	Va. I. C. & Coke, 50 $\frac{1}{4}$
Colorado Fuel, 32 $\frac{1}{2}$ -34 $\frac{3}{4}$	West'g'ase Elec., 76 $\frac{1}{4}$ -78 $\frac{3}{4}$
Deere & Co., pref., 95 $\frac{1}{2}$	Am. Ship, pref., 84
General Elec., 147-148 $\frac{1}{4}$	Chic. Pneu. Tool, 57 $\frac{1}{2}$ -59
Gt. N. Ore Cert., 36-37 $\frac{3}{4}$	Cambria Steel, 49 $\frac{1}{2}$ -50
Int. Harv., com., 104 $\frac{1}{4}$ -105 $\frac{1}{4}$	Lake Sup. Corp., 21-21 $\frac{1}{4}$
Int. Harv., Corp., 104-105 $\frac{1}{4}$	Warwick, 10 $\frac{1}{2}$ -10 $\frac{3}{4}$
Nat. En. & St., com., 12-12 $\frac{1}{2}$	Cruc. Steel, com., 16-16 $\frac{1}{4}$
	Cruc. Steel, pref., 92 $\frac{1}{2}$ -94 $\frac{1}{4}$
	La Belle Iron, com., 43

Dividends Declared

The Otis Elevator Company, quarterly, 1 $\frac{1}{4}$ per cent. on the common stock (an increase of $\frac{1}{4}$ of 1 per cent.), and regular quarterly, 1 $\frac{1}{2}$ per cent. on the preferred stock, both payable April 15.

The American Road Machinery Company, regular quarterly, 1 $\frac{1}{4}$ per cent. on the preferred stock, payable June 1.

The J. I. Case Threshing Machine Company, regular quarterly, 1 $\frac{1}{4}$ per cent. on the preferred stock, payable April 1.

The Dominion Iron & Steel Company, regular semi-annual, 3 $\frac{1}{2}$ per cent. on the preferred stock, payable April 1.

The Sloss-Sheffield Steel & Iron Company, regular quarterly, 1 $\frac{1}{4}$ per cent. on the preferred stock, payable March 18.

The American Brake Shoe & Foundry Company, regular quarterly, 1 $\frac{1}{4}$ per cent. on the common stock and 2 per cent. on the preferred stock, payable March 31.

The Union Switch & Signal Company, extra 33 $\frac{1}{3}$ per cent. on the preferred and common stocks, payable March 31; also regular quarterly, \$1.50 per share on the preferred and common stocks, payable April 10.

The United Shoe Machinery Corporation, regular quarterly, 1 $\frac{1}{2}$ per cent. on the preferred stock and 2 per cent. on the common stock.

The American Locomotive Company, regular quarterly, 1 $\frac{1}{4}$ per cent. on the preferred stock, payable April 21.

The Washburn Wire Company, regular quarterly, 1 $\frac{1}{4}$ per cent. on the common stock and 1 $\frac{1}{4}$ per cent. on the preferred stock, payable April 1.

The Safety Car Heating & Lighting Company, regular quarterly, 2 per cent., payable March 30.

The American Iron & Steel Mfg. Company, regular quarterly, 1 $\frac{1}{4}$ per cent. on the common stock and 1 $\frac{1}{4}$ per cent. on the preferred stock, payable April 1.

The Brier Hill Steel Company, regular quarterly, 1 $\frac{1}{4}$ per cent. on the preferred stock, payable April 1.

The Taylor-Wharton Iron & Steel Company, regular quarterly, 1 $\frac{1}{4}$ per cent. on the preferred stock, payable May 1.

The Wheeling Steel & Iron Company, regular quarterly, 2 per cent., payable April 1.

The Youngstown Sheet & Tube Company, regular quarterly, 1 $\frac{1}{4}$ per cent. on the preferred and 2 per cent. on the common stock.

The Westinghouse Air Brake Company, regular quarterly, 2 per cent. and 2 per cent. extra, payable April 15.

Personal

At the annual meeting of the Taylor-Wharton Iron & Steel Company, High Bridge, N. J., the following officers were elected: Chairman of the board of directors, A. E. Borie; president, Knox Taylor; vice-presidents, Dr. Henry M. Howe, V. Angerer and W. L. Wright; secretary and treasurer, W. A. Ingram.

Col. Henry G. Prout has been elected president of the Union Switch & Signal Company to fill the vacancy caused by the death of George Westinghouse. Col. Prout has been vice-president and general manager since January 1, 1903.

A. T. De Forest, Pacific coast representative of the American Steel and Wire Company and other subsidiaries, has been in New York in the past week preparing for the United States Steel Corporation's extensive exhibits at the Panama-Pacific Exposition.

W. H. Eulass, manager of the New York office of Joseph T. Ryerson & Son, is in the South on a month's vacation trip.

A reception tendered as a tribute to Prof. Ira Osborn Baker, who has just completed forty years of service on the engineering faculty of the University of Illinois, was held on the afternoon and evening of March 17 at the Hotel LaSalle, Chicago. The opportunity to thus honor Professor Baker was extended generally to the engineering profession and particularly to the many railroad engineers who were in attendance at the meetings of the American Railway Engineering Association last week. The professor has given practically all his life to the service of the university and occupies a prominent place as a writer on technical subjects.

E. John Hicks, formerly with the James S. Miller Company, Chicago, has become vice-president of the Merchants Steel & Supply Company, Marquette Building, Chicago, and will have charge of its scrap department.

J. T. Rader, Clyde, Ohio, recently general sales manager of the International Cutlery Company, Fremont, Ohio, severed his connection when the company was succeeded by the Clauss Shear Company. He will seek connections with manufacturers who market their product through the hardware jobber.

Sidney G. Johnson, formerly general sales manager of the Union Switch & Signal Company, Pittsburgh, has been elected vice-president in charge of sales.

Charles T. Lamb, for many years assistant treasurer and office manager of F. E. Reed Company, Worcester, Mass., and for the past two years office manager for Reed-Prentice Company, has resigned and severs his connection with the company May 1. He will engage in other business.

James M. Dickens has resigned from the J. I. Case Threshing Machine Company to become sales manager of the Advance Mfg. Company, Racine, Wis.

Guilliaem Aertsen, Midvale Steel Company; C. A. Buck, assistant general superintendent Bethlehem Steel Company, and F. D. Carney, general superintendent Pennsylvania Steel Company, have been appointed members of iron and steel committee of the American Institute of Mining Engineers.

H. F. Miller, who for the past year has been associated with the advertising department of the Otis Elevator Company and for four years previous to that with the Western Electric Company, has been appointed advertising manager of the Goulds Mfg. Company, Seneca Falls, N. Y.

John Kenney, foreman of the electrical department of the La Belle Iron Works, Steubenville, Ohio, has resigned to become assistant general manager of the plant of the Wheeling Sheet & Tin Plate Company, Yorkville, Ohio.

Frederick W. Taylor, "the father of scientific management," is to speak at a dinner to be held in New York City April 7, by the Efficiency Society in connection with the Efficiency Exposition scheduled for April 4 to 11, at the Grand Central Palace, New York.

E. W. Rickey, formerly secretary and general sales manager for the Standard Forgings Company, has re-

signed to become associated with the sales department of A. M. Castle & Co., iron and steel jobbers, Chicago.

Eli Webb, superintendent of Joseph E. Thropp's Earliston Furnace, Earliston, Pa., has tendered his resignation to take effect April 1.

Prof. Forrest E. Cardullo, at present professor of mechanical engineering, New Hampshire College of Agriculture and the Mechanic Arts, Durham, N. H., will be identified in a similar capacity, beginning next college year, with the University of Texas, Austin, Tex.

Rollin W. Hutchinson, who has been an active promoter of the motor truck industry in this country, and is known as an authority on trucks and transportation, has been appointed general sales and advertising manager for the Sternberg Mfg. Company, Milwaukee, Wis.

Richard Peters, Jr., who for some time has been identified with the W. J. Rainey coke interests at Uniontown, Pa., has resigned and on April 1 will become connected with the Producers' Coke Company, Uniontown, meeting the blast furnace trade in the sale of that company's product.

A. E. Gillespie, Youngstown, Ohio, denies the report that he has been appointed manager of the Joseph E. Thropp blast furnaces at Everett, Pa.

W. W. Williams, of the sales department of A. M. Byers & Co., Inc., Pittsburgh, makers of wrought-iron pipe, has been promoted to the position of manager of sales and T. L. Lewis has been made assistant manager of sales. W. W. Weller, formerly manager of sales, has been appointed Eastern representative, with office in room 410 Woolworth Building, New York City.

At the organization meeting of the directors of the American Steel Foundries last week, the resignation of William V. Kelley as chairman of the company was accepted and the office was abolished.

W. P. Snyder, president Shenango Furnace Company, Pittsburgh, has returned from Florida.

Obituary

WILLIAM A. DUTTON, one of the founders of the Van Dorn & Dutton Company, Cleveland, Ohio, and secretary and treasurer of that company for about 20 years until his retirement four years ago, died March 21 at St. Augustine, Fla., where he had been spending the winters for several years. He was 60 years of age. Death resulted from an operation. He leaves a widow and a daughter.

J. GORDON TAYLOR, secretary and treasurer of the Eagle White Lead Company, Cincinnati, Ohio, died at his home in that city March 19, aged 67 years. He enlisted in the army during the civil war, although very young, and was commissioned a captain by President Lincoln later, taking a prominent part in many battles. Until his health failed he took an active interest in political affairs. He leaves a widow.

EDWIN N. CORYELL, consulting engineer, died suddenly March 23 in his office of heart disease, aged 66 years. He had been employed for 30 years as consulting engineer by the Cameron Steam Pump Works, owned by the Ingersoll-Rand Company, 11 Broadway, New York.

ED. P. WILLIAMS, formerly superintendent of the merchant blast furnaces of the Tennessee Coal, Iron & Railroad Company, Birmingham, Ala., is named among those who lost their lives in the Missouri Athletic Club fire at St. Louis, March 8.

WILLIAM F. MURRAY, of Murray Brothers, machinists, San Francisco, Cal., died March 10, aged 65 years. He was a native of Bedford, Me., went to San Francisco in 1864 and started in the machine business for himself in 1880.

HERMANN RIETSCHER, professor for 25 years at the Royal Technical High School, Charlottenburg, Berlin, Germany, and a world authority on heating and ventilation, died at Charlottenburg, February 18, aged 67 years.

HENRY GREEN, vice-president Ohio Falls Iron Company, New Albany, Ind., died March 14.

Pittsburgh and Valleys Business Notes

The Youngstown Sheet & Tube Company has bought the site formerly occupied by the American Bridge Company's plant at Haselton, Ohio, east of Youngstown. The intention is to utilize it for building railroad tracks to afford better shipping facilities for the company's works at East Youngstown. The statement that a by-product coke plant is to be built on the property is untrue, as it is not large enough for this purpose.

Janssen & Abbott, architects, Century Building, Pittsburgh, will draw the plans for the new Will Penn Hotel to be erected on the Frick property on Sixth avenue, Pittsburgh, by the Fort Pitt Hotel Company. This hotel, which is to be the largest in Pittsburgh, will cost between \$2,000,000 and \$3,000,000. It is expected that 6000 to 8000 tons of steel will be required, the contract for which will likely be placed in the near future.

An artificial ice plant is to be erected in Youngstown, Ohio, by the Distilled Water Ice Company, of which W. H. Winsworth is president and general manager. It is said the plant will cost approximately \$100,000.

The Pittsburgh Model Engine Company, Pittsburgh, recently incorporated with a nominal capital of \$5000, has increased it to \$500,000.

The Ideal Tool & Mfg. Company, Beaver Falls, Pa., manufacturer of dies and tools, is making a new type of automatic threading die and will shortly put on the market a collapsible tap. The company expects to need considerable new equipment in the near future.

The Ahlberg Kerosene Carburetor Company, Pittsburgh, has been granted a Delaware charter with a capital of \$300,000, the incorporators being Harry Davis, P. W. Burke and N. J. Dain, all of Pittsburgh.

The Riter-Corbin Engineering Company, Pittsburgh, has received a contract for the building of lock gate No. 48 for a dam at Louisville, Ky., across the Ohio River, in which about 300 tons of plates and shapes will be used.

The New Castle Steel & Iron Company, which some time ago took over the plant of the New Castle Forge & Bolt Company, at New Castle, Pa., has under advisement an increase in its capital stock from \$400,000 to \$500,000, and possibly to take up some new lines of manufacture, but as yet no definite decision has been reached.

While puddlers belonging to the Amalgamated Association will work in March and April for \$5.70 per ton for boiling, it is understood that A. M. Byers & Co., Inc., Girard, Ohio, and Pittsburgh, will pay \$6.

Application for a charter has been made for the Pittsburgh Steel Sales Company, which will be an identified interest of the Pittsburgh Steel Company, Frick Building, Pittsburgh. It is understood that the new company will handle the sales of wire and wire nails and other products made by the Pittsburgh Steel Company in some of the Western States.

The Griffin Mfg. Company, Erie, Pa., has completed a new mill to roll cold-rolled steel up to 18 in. wide. It has contracted for a new 1000-hp. power plant, to include an Allis-Chalmers Corliss engine and generator and Wickes boilers and will make other additions.

The Erie Bolt & Nut Company, Erie, Pa., will begin the erection of its new factory at once and expects to have it ready for occupancy in 60 days. The building will be 60 x 212 ft., of brick and steel construction.

Tate-Jones & Co., Inc., Pittsburgh, announce recent shipments of their portable oil rivet forges as follows: Isthmian Canal Commission, Balboa Shops, six; Browning Engineering Company, Cleveland, Ohio, one; Barney & Smith Car Company, Dayton, Ohio, six; Stewart Heater Company, Buffalo, N. Y., one. Recent shipments of heat treating furnaces have been made to the following: Pennsylvania Railroad, Renovo shops; Navy Department, Boston Navy Yard; Sullivan Machinery Company, Claremont, N. H.; Southern Railway Company, Citico, Tenn., and James H. Matthews Company, Pittsburgh.

The last five mills of the new tin-plate plant erected by the Wheeling Sheet & Tin Plate Company at Yorkville, Ohio, will begin operations March 30. A cold air ventilating system will be installed and cold water shields for the heaters and helpers will be added.

The property of the Kidd Brothers & Burgher Steel Wire Company, situated in Aliquippa, Pa., will be sold at public auction in the rotunda of the Allegheny County court house, Pittsburgh, on Monday, March 30, at 10 a. m. The property to be sold includes real estate, buildings, machinery and all other equipment as well as corporate franchises. T. W. Friend, Conestoga Building, Pittsburgh, is the receiver and announces the sale by virtue of a court decree made March 10.

The Pittsburgh Foundry & Machine Company, Pittsburgh, has purchased a site at Thirty-sixth Street and the Allegheny Valley Railroad, in that city, on which it will build a modern foundry, for which plans are now being prepared.

The will of George Westinghouse was filed at Pittsburgh last week. It gives his widow two-thirds of his stock in the Westinghouse Air Brake Company and the other third to his son, George Westinghouse. Certain employees of the company and in his household were given a year's salary. Of the residue of his estate, 40 per cent. goes to his widow, 40 per cent. to his son and 20 per cent. to his brother, H. H. Westinghouse. The value of the estate is not indicated in the will, but it is estimated at \$30,000,000 to \$35,000,000.

The Jones & Laughlin Steel Company, Pittsburgh, is completing a shipment of 1200 tons of plates for caisson work on the Panama Canal. It has furnished over 10,000 tons of plates for this class of work. Out of 10 contracts made by the Government it secured 8.

The number of idle men in the Pittsburgh district is increasing rapidly. In one day recently no less than 746 men applied for employment at the Edgar Thomson works of the Carnegie Steel Company.

The report that A. M. Byers & Co., Inc., Pittsburgh, maker of wrought-iron pipe, will build more puddling furnaces at Girard, Ohio, is untrue. The matter has been under consideration for some time, but no decision has been made. The report that the company will remove its pipe mills from Pittsburgh to Girard is also untrue.

The Vulcan Crucible Steel Company, Pittsburgh, has been incorporated with \$500,000 capital. Samuel G. Stafford, Coraopolis, Pa., is treasurer.

The Rickert-Shafer Company, Erie, Pa., has been incorporated with \$10,000 capital to deal in machinery. August A. Rickert is treasurer.

The American Ship & Car Hardware Company, Beaver, Pa., has filed notice of an increase in its stock amounting to \$100,000. The total of the stock is now \$150,000.

Both Germany and the United Kingdom exceed the United States in imports as well as in exports of iron and steel. Imports of iron and steel manufactures in the calendar year 1913 into these three principal manufacturing nations of the world are as follows: United States, \$34,000,000; Germany, \$46,000,000; the United Kingdom, \$145,000,000. Compared with 1912 the foregoing figures represent, in the case of the United States, an increase of \$5,000,000; Germany, a decrease of \$1,000,000, and the United Kingdom, an increase of \$18,000,000.

The Emporium Iron Company will blow in its furnace at Emporium, Pa., about April 1. It has been out of blast since July 18, 1913, and meantime has been relined.

The Alan Wood Iron & Steel Company, Philadelphia, is about ready to put into operation its new 84-in. plate mill, which is to have a capacity of about 50,000 tons annually.

Pig Steel from Ore in the Electric Furnace

Experimental Investigation Into the Conditions of Its Manufacture—Practical Results in Sweden and California

In a paper of considerable length, presented at the February meeting in New York of the American Institute of Mining Engineers, Robert M. Keeney, Pittsburgh, Pa., of the U. S. Bureau of Mines, discusses the subject of "Pig Steel from Ore in the Electric Furnace." The term "pig steel" has been defined by Dr. J. W. Richards of Lehigh University as "a metal with 2.2 per cent. or less of carbon, a very small amount of silicon and manganese, low in sulphur and phosphorus, and made directly from ore in the electric pig-iron furnace." In chemical composition it is steel. Important extracts from the paper are the following:

In this paper the writer does not advocate the production of pig steel from ore in the electric furnace as a competitor of the present method of steel production with pig iron as an intermediate step, but presents the general metallurgical side of such a process and its economical possibilities in regions where power is cheap, and fuel and reducing materials are expensive, as, for example, Sweden, California, British Columbia, and the western coast of South America. The field of the electric furnace in pig-iron manufacture is restricted to such areas, and possibly will never have great application even in favorable districts, because of the cheapness with which iron ore can be delivered from western coast deposits to furnaces upon the eastern coast of the United States on the completion of the Panama Canal. But when in these countries local demand for pig iron and steel is great enough, the electric furnace has an opportunity. In such cases, if steel is the desired final product, it seems more feasible and cheaper to produce as pure a product as possible—pig steel—for any subsequent refining operations, rather than pig iron. This would prove to be the case for two reasons:

1. As has been found to be the case at Heroult, Cal., Domnarfvet, and Trollhättan, pig steel can be produced more cheaply in the electric shaft furnace than pig iron, because of the greater output per unit of electrical energy consumed.

2. Owing to the lower percentage of impurities in pig steel, 1 to 3 per cent., instead of 4 to 8 per cent. in pig iron, a greater output can be obtained from the final refining furnace at a lower cost.

CONDITIONS TO BE MET

A process to produce efficiently a metal conforming to these requirements should satisfy the following conditions:

1. As the product in order to be a steel must not contain over 2.2 per cent. carbon, it should be possible not only to keep the percentage of carbon in the metal below that amount, but it should also be possible to regulate the carbon within reasonable limits, i.e., control the composition of the metal.

2. The product should contain percentages of silicon, phosphorus, and sulphur either below the limit set by consumers of Bessemer and open-hearth steels, or at least low enough not to require prolonged refining in another furnace.

3. The loss of iron in the slag should not be excessive.

4. The furnace used must be adapted to continuous operation and the production of a large tonnage.

5. By the process it should be possible to produce pig steel at a greater profit than by existing methods.

Considering the possibility of the use of the electric furnace to satisfy these requirements:

1. As it is not necessary to introduce carbon for fuel in the electric furnace it is not necessary to have excess carbon in the charge beyond that needed for reduction, therefore no difficulty should be experienced in keeping the carbon of the product below 2.2 per cent.; and it should be possible to regulate the carbon within reasonable limits.

2. The temperature of the electric furnace can be regulated by the power input, so that very basic slags can be used, which should result in slagging of silicon, phosphorus, and sulphur.

3. While the loss of iron in the slag with an electric furnace running on pig steel would probably be greater than in the case of pig iron, owing to the weaker reducing atmosphere of the pig-steel furnace, it should not be so excessive as to prohibit the use of such a process under favorable economic conditions.

4. The electric shaft furnace has been proved to be easily adapted to continuous operation for pig-iron production, and should operate more uniformly on pig steel than on pig iron because there is not the tendency for carbon to accumulate in the furnace.

5. In localities where electric-furnace pig iron can be produced at a profit, pig steel for further refining could be made at a profit if the market demand was for steel.

SCOPE OF THE EXPERIMENTS

Some experimental work performed by the writer in 1911 under a Carnegie Research Scholarship of the Iron and Steel Institute of Great Britain and the work of others serve to show the metallurgical possibilities of the electric furnace for the production of pig steel from ore, and whether the process satisfies the five stated requirements. Five groups of experiments were made on the electric-furnace production of pig steel, arranged as below:

Group I. A series in which both limestone and coke were varied in the charge.

Group II. A series in which the amount of coke in the charge was varied, other components remaining constant.

Group III. A series in which the amount of limestone in the charge was varied, other components remaining constant.

Group IV. A series in which a part of the limestone was replaced by varying amount of fluorspar, other components remaining constant.

Group V. An experiment in which the furnace was operated continuously rather than intermittently, as in the other experiments.

Mr. Keeney here presents the details of the effect on the composition of the pig steel of the various alterations in the charges in accordance with these experiments and furnishes numerous analyses of the product and the slags, the yields and the kilowatt-hours per gross ton of pig steel produced. Commenting on these he says:

Trouble was experienced at the Hardanger, Norway, electric pig-iron plant with coke as a reducing material. The failure of this plant has been assigned to the use of coke, because coke has a higher electrical conductivity than charcoal and hence not as much heat is generated by the resistance of the charge to the passage of the electric current. For this reason, trouble might be experienced, with a shaft furnace using coke as a reducing agent in the production of pig steel, but the problem will undoubtedly be solved eventually. The writer visited the Hardanger plant a few months before it was closed, and from observation of existing conditions does not believe the failure of the enterprise was entirely due to use of coke.

J. Crawford says that at Heroult, while difficulty was experienced with coke alone as a reducing material, "by adopting certain precautions in crushing the stock and feeding the same into the furnace I have operated on a mixture of 60 per cent. coke and 40 per cent. charcoal with a very fair degree of furnace efficiency. I believe that many of our coals which make a poor metallurgical coke for blast furnace use on account of their low crushing strength might be found to make a satisfactory fuel for electric furnace use."

The results at both Domnarfvet and Trollhättan indicate that pig steel can be made directly from ore in the electric shaft furnace. In these runs no attempt was made to produce pig steel, but the product contained from 1 to 3 per cent. carbon, as before stated. While it would undoubtedly be more difficult to regulate the carbon of the product in a shaft furnace operated continuously than in an intermittent hearth furnace, it could be done, but the regulation would not be so close.

SUMMATION OF THE RESULTS

Summarizing the results of the experiments he says as to carbon: 1. In producing pig steel containing from 0.25 to 1.50 per cent. carbon for any particular furnace and basicity of charge, the carbon content of the pig steel can be regulated by varying the carbon in the charge. 2. An increase or decrease of lime in the charge causes a corresponding decrease or increase of carbon in the pig steel. 3. The use of fluorspar in excessive quantities causes a marked increase in the carburization of the pig steel. 4. The experiments of Neveu and Arnou indicate that the carbon of reduction may be supplied from coke, anthracite coal, or charcoal, and the charge may be fine, coarse, or briquetted. 5. The work at Domnarfvet and Trollhättan shows the possibility of keeping the carbon of the product below 2.2 per cent. in an electric shaft furnace.

As to silicon the experiments show in general that the percentage of silicon in the pig steel can be kept at a low figure if desired, and that its regulation is not difficult.

The conclusions as to phosphorus, drawn from these results, are: 1. Increased carbon in the charge causes an increase of the percentage of phosphorus in the pig steel, because of the

stronger reducing conditions. 2. Increased basicity of the slag does not cause the slagging of more phosphorus if the slag is very thick. 3. If a small amount of fluorspar is added to thin the basic slag, the slagging of the phosphorus is assisted. 4. Continuous operation of the furnace does not increase phosphorus in the pig steel. 5. Owing to the more oxidizing conditions in the electric furnace when pig steel is being made rather than pig iron, a greater percentage of the phosphorus is slagged.

And as to sulphur the conclusions arrived at are: 1. An increased reducing atmosphere aids in the passage of sulphur into the slag. 2. Increased basicity of the slag causes more of the sulphur to be slagged. 3. By thinning the slag a small amount of fluorspar assists in sulphur elimination from the pig steel, but an excess has the contrary effect. 4. Continuous operation of the furnace does not cause increased sulphur in the pig steel. 5. With a fluid basic slag, sulphur can be slagged readily in the electric furnace production of pig steel in both a continuous and an intermittent operation.

With steady operation in a large furnace, the loss of iron in the slag should not exceed 4 per cent. of the total iron charged, depending on the amount of carbon desired in the product, but if a pig steel containing less than 0.25 per cent. carbon is produced there will probably be a greater loss of iron in the slag.

ADAPTABILITY TO CONTINUOUS OPERATION

An experiment was made, extending over several hours, to note the effect upon the pig steel of continuous charging and tapping rather than intermittent operation of the furnace. In addition to hematite, limestone and coke a small quantity of fluorspar was charged. A tapping was made about the middle of the run, which resulted in the following products: Pig steel, carbon 0.39, manganese 0.08, silicon 0.12, phosphorus 0.031, sulphur 0.048 per cent.; slag, SiO₂ 30.48, CaO 31.30, MgO 13.39, FeO 15.20, Al₂O₃ 9.28 per cent.

The power consumption was 3940 kw-hr. per gross ton of pig steel. From the product it may be seen that as good a grade of pig steel can be produced in an electric furnace when operated continuously as when operated intermittently.

The results of electric-furnace pig-iron manufacture in Sweden also show the feasibility of pig-steel production in the electric shaft furnace, as regards carbon and impurities in the pig steel and loss of iron in the slag. J. Crawford remarks as a result of his experience at Heroult with an electric shaft furnace: "The matter of too little carbon gives less trouble, and if the furnace is producing low silicon and carbon iron should give none at all." From his results it appears that it is easier to operate the shaft furnace when making pig steel than when making pig iron. From the results available it seems that there should be no greater difficulty in the elimination of impurities from pig steel in a continuous shaft furnace than in intermittent operation.

COST OF PRODUCTION

In any place where there is a market for steel, and pig iron can be made at a profit in the electric furnace, it will be more profitable in the end to make pig steel for subsequent refining in an electric furnace or open-hearth, than to produce electric-furnace pig iron with a subsequent refining to steel.

This is true because the power consumption has been found to be lower per ton of pig steel than per ton of pig iron, and because the time necessary for refining is reduced, which results in a greater output at a lower cost.

The results of the early experiments at Domnarfvet show that the power consumption per ton of metal produced decreased as the amount of carbon charged per ton of iron was reduced. In the latest report of the engineers at Trollhättan, it is stated that the power consumption per ton of pig iron varies in proportion to the iron content of the ore. A poor ore and pig iron high in silicon and manganese require more power than a rich ore and pig iron low in silicon and manganese. This was also found to be the case in California. The results of the writer, of course, show a high power consumption because of the small size of the furnace.

Among other expenses of pig-steel production, maintenance and capital charges would be about the same as for electric-furnace pig-iron production. The labor cost per ton of product would be a little lower for pig steel. The electrode consumption per gross ton of pig iron has been reduced to 6.7 lb. It might be a little higher in making pig steel, because of there being less carbon in the charge, but it should not exceed 15 lb. per ton of pig steel.

The use of pig steel in the open-hearth was tried out at Degerfors, Sweden. It was found that pig steel produced by the electric shaft furnace was more suitable for steel making in the open-hearth than ordinary pig iron, and required less time for complete refining. Normal pig iron made in the electric furnace was found to be less suited to the production of open-hearth steel than normal blast-furnace pig iron. This shows the advantage of production of pig steel rather than pig iron in the electric furnace when steel is to be the final product.

GENERAL SUMMARY

1. In the electric-furnace production of pig steel from ore, carbon in the product can be kept below 2.2 per cent., and regulated to an extent by the amount of carbon charged, without resulting in excessive loss of iron in the slag or in the production of a pig steel very high in impurities, if a fair grade of ore is used.

2. It is not difficult to slag the greater part of the silicon, phosphorus and sulphur of the charge, if the furnace is hot and the slag fluid, but conditions are less favorable to the slagging of sulphur than of other impurities in the operation of an electric furnace for pig-steel production, which is, of course, contrary to experience in the manufacture of pig iron.

3. The loss of iron in the slag should not be excessive unless the pig steel produced is of very low carbon content.

4. From the results with the Domnarfvet, Trollhättan, and Heroult furnaces, there does not appear to be great difficulty attending the production of pig steel in an electric shaft furnace, and in fact experience has shown that there is less difficulty in the operation of the electric furnace on pig steel than on pig iron.

5. At any place where there is a market demand for steel, and pig iron can be made in the electric furnace at a profit, the steel ultimately produced would be cheaper, if made by the electric reduction of iron ore to pig steel, followed by refining in another furnace if necessary, than if the product of the electric-reduction furnace was pig iron to be subsequently converted to steel in another furnace.

COKE PLANT SAFEGUARDS

Some of the Regulations in Force at the Inland Steel Plant

Accidents and their prevention in working coke ovens is the subject of an article by H. R. De Holl, superintendent of the by-products coke ovens of the Inland Steel Company, published in the Safety Bulletin of that company for February. Pertinent suggestions are given for each part of the plant, such as the crusher house, the screening station, and the by-products department, and from the article the following has been taken:

Regarding the mixer building, Mr. De Holl writes as follows: "All coal should be emptied from the mixer bins at least once a month, and the foreman must always be on his guard to avoid spontaneous combustion. If it is necessary that lights be lowered into these bins, it is absolutely essential that the wires be examined every time a light is lowered, the insulation must be in perfect condition, and every precaution taken to avoid short-circuits and flashes which would cause an explosion. This work should be done when the coal dust is settled, preferably the first thing in the morning, before the coal is stirred up. The power must be turned off when screwing new lamp globes in the sockets anywhere that coal dust is in evidence."

In connection with the battery of ovens, he makes the following suggestion: "No one but the heater-man in charge should turn off the gas from the fuel main. The main valves at the north end of the battery should never be closed until after personal inspection he has ascertained that the cocks on each individual oven are turned off. This is of extreme importance. Another thing of equal importance is the precaution to bring the larry-car under the coal bin empty. Cases are on record where disastrous fires and explosions have been caused by a little red hot coal in the bottom of the larry-car when placed under the bins. Men working on the battery should wear clogs to prevent burning their feet.

"When opening the lids on top of the oven the lid-man should first crack it slightly allowing the gas to escape. If the lid is removed at once and suddenly the escaping gas might ignite and burn anyone near by. The damper-man should always stand to the windward side when opening the covers of the ascension pipes, so that the wind cannot blow the flames in his direction."

Accompanying the article are a few illustrations, one to show what is likely to happen when coke is pushed into the rack, and one attempts to pass it too closely, and another showing a man balancing himself on a traveling belt conveyor with the injunction under the picture, "Do not ride on conveyor belts." In this connection it is emphasized that accumulation of coal must be kept from under the belts, and that no cleaning should be done when the belt is running, if possible. It is, of course, also emphasized that no smoking or open lights are permitted in the belt gallery running from the crusher building to the mixer building, or from the mixer building to the coal bin.

In view of the withdrawal of James S. Miller from the James S. Miller Company, dealer in scrap and mill and railroad supplies, 1432 McCormick Building, Chicago, the directors have changed the name of the company to the Atlas Iron & Steel Company.

United States Steel Corporation's 1913 Report

(Continued from page 791)

rendered both to subsidiary companies and to the public. The earnings for the year resulting from this business represent the combined profits accruing to the several corporate interests on the respective sales and services rendered, each of which is in itself a complete commercial transaction. The following is a statement of the gross sales and earnings classified by operating groups, the gross sales of products included being on the basis of f. o. b. mill values:

	1913	1912
Gross sales by manufacturing, iron-ore and coal and coke companies:		
To customers outside of U. S. Steel organization	\$518,999,605	\$494,637,808
Inter-company sales (between subsidiary companies)	211,910,441	189,257,318
	\$730,910,046	\$683,895,126
Gross earnings and receipts of transportation and miscellaneous companies:		
Transportation companies	57,726,430	53,665,603
Miscellaneous companies	8,257,823	7,944,786
Total	\$796,894,299	\$745,505,515

INVENTORIES

The following is a general classification of the inventory valuations at December 31, 1913, in comparison with the valuations at the close of the preceding year:

	1913	1912
Iron ores	\$69,824,953	\$62,002,998
Pig iron, scrap, ferro and spiegel ..	10,096,086	6,508,517
Coal, coke and other fuel	4,982,279	3,050,449
T. n. spelter, copper, nickel, aluminum, etc.	8,484,654	8,008,668
Limestone, fluxes and refractories ..	2,636,522	1,991,662
Rolls, molds, annealing boxes, etc. ..	6,609,725	6,681,800
Manufacturing supplies not classified	17,316,734	15,716,369
Ingots, steel	1,655,140	1,686,044
Blooms, billets, sheet and tin bars, etc.	10,640,524	7,714,124
Wire rods	824,551	1,257,211
Skelp	1,867,168	1,709,708
Finished products	37,227,313	30,734,146
Mine supplies and stores	3,046,390	3,077,272
Railroad supplies and stores	4,289,190	3,546,969
Merchandise of supply companies ..	894,003	864,528
Material, labor and expense locked up in bridge and structural contracts, less bills rendered on account	2,428,419	4,399,182
Stocks abroad and on consignment ..	8,338,136	6,272,267
Material in transit	1,047,024	2,736,911
Total inventory valuations to subsidiary companies	\$190,209,111	\$167,958,832
Amount included therein representing profits of subsidiary companies on inter-company sales of materials and products on hand	22,574,320	15,546,578
Valuations exclusive of inter-company profits	\$167,634,791	\$152,412,254

The increase in the above total for 1913 is attributable partly to the broadening of the policy of carrying stocks of finished products at both domestic and foreign warehouses and partly to the sharp curtailment in manufacturing operations in the last quarter, increasing stocks of materials on hand.

EMPLOYEES AND PAYROLLS

The average number of employees in the service of all companies in 1913, in comparison with 1912, was as follows:

	1913	1912
Manufacturing properties	165,277	161,774
Coal and coke properties	24,996	24,394
Transportation properties	13,789	12,597
Miscellaneous properties	21,951	19,438
Total	228,906	221,025
Total salaries and wages paid	\$207,206,176	\$189,351,602
Average per employee per day:		
All employees, exclusive of general administrative and selling force	\$2.85	\$2.68
Total employees, including general administrative and selling force	\$2.92	\$2.75

The above totals for 1913, both in respect of number of employees and aggregate pay roll, were the largest in the corporation's history. The relative percentages of increase, namely, 3.57 per cent. in number of employees and 9.43 per cent. in total payroll reflect the general advance in wages and salaries made to the larger proportion of the employees February 1, 1913,

to which reference was made in last year's annual report. This advance affected about 75 per cent. of the employees, the 25 per cent. not affected being the higher paid wage earners and salaried employees. The increase was about 12½ per cent. in the case of employees receiving less than \$2 per day, and graduating downward from this percentage in respect of those receiving higher rates per day. The average increase in the entire payroll (including both employees whose rates of pay were and were not affected) arising from this advance in wages and salaries was 6 per cent., and the increased amount paid employees in 1913 because of this advance was approximately \$12,000,000.

During the year there was disbursed by the trustees of the United States Steel and Carnegie pension fund the sum of \$466,194.68. At the close of 1913 there were 2092 on the pension rolls. At December 31, 1913, there was set aside from accumulated surplus of the corporation an additional \$500,000 for permanent pension fund reserve, making a total of \$2,500,000 to the credit of the fund at the close of the year. The total amount (including the foregoing \$2,500,000) to be supplied by the corporation as principal for this fund is \$8,000,000, at the rate of \$500,000 annually.

EMPLOYEES' STOCK SUBSCRIPTIONS

In continuance of the plan observed in previous years, beginning with 1903, the employees of the United States Steel Corporation and the subsidiary companies were, in January, 1914, offered the privilege of subscribing for preferred and common stock of the corporation. The subscription price was fixed at \$105 per share for the preferred and \$57 per share for the common stock. The annual allowances for five years for special compensation or bonus to be paid subscribers who retain their stock were fixed at \$5 per share for the preferred and \$3.50 per share for the common stock. The conditions attached to the offer and subscription, aside from the features of subscription price and the amount of special compensation or bonus to be paid, were substantially the same as those under which stock has been offered to employees in each of the previous 10 years. Subscriptions were received from 46,498 employees for an aggregate of 42,926 shares of preferred and 47,680 shares of common stock, as against subscriptions the previous year from 36,119 employees for an aggregate of 34,551 shares of preferred and 25,793 shares of common stock.

SHIPMENTS—DOMESTIC AND EXPORT

The shipments of all classes of products to customers outside of the organization in 1913, in comparison with shipments in 1912, were as follows:

	1913	1912
Domestic—tons.		
Roller steel and other finished products ..	10,412,430	10,299,890
Pig iron, ingots, spiegel, ferro and scrap ..	451,980	501,327
Iron ore, coal and coke	1,617,169	1,825,265
Sundry materials and by-products	88,844	70,453
Total of all materials except cement	12,570,423	12,696,935
Cement (bbl.)	10,382,883	10,047,579
Export—tons.		
Roller steel and other finished products ..	1,756,328	2,233,570
Pig iron, ingots and scrap	56,104	46,503
Sundry materials and by-products	640	723
Total of all materials	1,813,072	2,280,796
Grand total of roller steel and other finished products shipped to both domestic and export trade, tons	12,168,758	12,533,460

The reduction in export shipments in 1913 from 1912 arose in part from a slackening in the demand, due principally to the money stringency in foreign markets in 1913, and in part to the inability of the mills to furnish, when required, sufficient material for export in the first six months of the year because of the demands of domestic consumers. The export shipments to Mexico were also curtailed owing to the unsettled condition of affairs in that country.

MAINTENANCE AND REPLACEMENTS

The expenditures made during the year for repairs, maintenance and general up-keep of the properties, in comparison with the outlays for similar purposes in 1912, were as follows:

	1913	1912
Ordinary repairs and maintenance...	\$52,551,630	\$43,853,137
Extraordinary replacements and general rehabilitation	7,391,340	4,895,300
Total	\$59,942,970	\$48,748,437

The foregoing disbursements in 1913 exceeded the amount of outlays made for similar purposes in any previous year. The plants and properties of the several subsidiary companies are in excellent physical condition.

The aggregate amount of charges to and allowances from gross earnings for the year to cover deterioration arising from wear and tear of improvements, obsolescence and exhaustion of minerals, was \$84,237,608, compared with \$75,425,854 for the preceding year. Included in these respective totals are the above mentioned expenditures for ordinary repairs and maintenance.

EXPENDITURES FOR NEW CONSTRUCTION

The expenditures made and charges incurred during the year by the corporation and subsidiary companies for additional property, new plants, extensions and construction, less credits for property sold and for stripping and development work at mines, aggregated \$41,999,098.33, as follows:

For the Gary, Ind., properties.....	\$2,960,124.92
For the new Minnesota steel plant at Duluth, Minn., and the railroad connecting it with trunk lines	5,912,027.44
For Tennessee Coal, Iron & Railroad Company extensions	1,274,440.84
For acquirement of fee title to various iron-ore properties previously held under royalty contracts	11,670,181.87
For all other properties and extensions, including net credit account of mine stripping and development operations	20,182,323.26

The charge, as above, for acquirement of fee title to iron-ore properties previously held by the subsidiary companies under royalty contracts was based in part on commuting to their present day value certain of the royalties which would have become payable under the contracts; and in part on the par value of certain of the royalties, issuing, however, in settlement for the amount thereof non-interest-bearing purchase money obligations or notes payable in instalments during the period for which the contracts had yet to run. Of the total charged as above, \$2,283,677.63 only has been paid in cash, and the balance, \$9,386,504.24, is covered by purchase money notes of the Oliver Iron Mining Company, guaranteed by the corporation. Of these notes, \$1,240,403.68 bear 4 per cent. interest per annum, and \$8,146,100.56 are non-interest-bearing notes. The notes are payable in annual instalments of various sums from 1915 to 1954, inclusive.

Construction work on the new steel plant at Duluth and the connecting railroad to serve it proceeded during the year. It is expected this plant will be completed for operation in the spring of 1915. It will comprise 2 blast furnaces, 10 open-hearth furnaces, 1 40-in. blooming mill, one combination 28 and 18 in. rail and shape mill, one combination 16, 12 and 8 in. merchant mill, and a by-product coke plant of 90 ovens, together with the necessary complement of auxiliary departments, such as power plants, pumping stations, machine and other shops. There has been laid out adjacent to the plant a subdivision on which work has been commenced in the building of houses for use by employees. The total expenditures made to the close of 1913 for acquirement of the land for site of steel plant and subdivision, for construction of plant, development of subdivision and building of the railroad, was \$13,445,648, all of which has to date been advanced from the current assets of the corporation. There is under consideration a suggestion to reimburse the treasury for a substantial part of this outlay, and additional outlays yet to be made in connection with the work, through an issue and sale of bonds secured on the property.

Work was begun on the construction of an additional cement plant located adjacent to the new steel plant at Duluth, Minn. This will have an annual capacity of 1,400,000 bbl. It is being constructed by the Universal Portland Cement Company, a subsidiary company. The plant will utilize in the manufacture of

cement blast furnace slag from the steel plant. It will probably be completed for operation in 1915.

The unfinished new rod mill and wire plant of the American Steel & Wire Company, located at Fairfield, a suburb of Birmingham, Ala., was completed and went into operation in February, 1914. The plant has a capacity of 400 tons per day of finished wire products of various kinds.

Large outlays were made in the construction at the Edgar Thomson works of the Carnegie Steel Company of a new 14-furnace open-hearth plant, and for the relocation, rebuilding and enlargement of the blooming mill and the No. 2 rail mill. These mills will produce a greater diversity of product and will otherwise be of advantage. A considerable part of this new work was completed and in operation at the close of the year. At the Duquesne works of the Carnegie Company a new 10-in. electrically driven bar mill was installed; and at McCutcheon works a new steel hoop mill was completed and placed in operation.

At the South works of the Illinois Steel Company two additional open-hearth furnaces and a new 300-ton hot metal mixer were installed; and at the Gary works a new 36-in. reversing slabbing mill was completed and placed in operation.

The various subsidiary railroad companies during the year acquired by purchase or construction 58 additional locomotives and 3578 cars of various kinds. They also acquired on replacement account 12 locomotives and 293 cars. There were placed in commission on the Great Lakes during the year three new 12,000-ton ore-carrying steamers; and one additional freight steamer was purchased for service in the export trade. The corporation now owns four ocean-going steamers.

In the construction of a new steel ore dock of 384 pockets at Duluth, the Duluth, Missabe & Northern Railway Company expended during the year \$1,516,830. This dock will be completed in 1914 and its total cost will be about \$3,000,000.

In addition to the outlays during the year for the construction of new plants and for the additions and betterments above specifically referred to, the several subsidiary companies expended in the aggregate a large amount for sundry miscellaneous additions, extensions and improvements.

At the close of the year the amount unexpended on authorized appropriations for new plants, construction and extraordinary replacements, including iron-ore mine stripping programme for 1914, was, approximately, \$26,000,000.

The report makes no statement regarding the proposed manufacturing plant at Ojibway, Ont., Canada, which was alluded to in the report for 1912.

Iron Two Centuries Old

The analysis of a "ham bone," made at least two centuries ago at the Little Aston forge near Birmingham, England, is as follows, according to Engineering, London: Combined carbon, 0.31 per cent.; silicon, 0.05 per cent.; phosphorus, 0.31 per cent.; sulphur, 4.93 per cent., with no manganese or graphitic carbon. The high sulphur and low carbon and silicon are considered noteworthy in metal made so long ago. The iron in question was recently found in lumps varying in weight from 20 to 56 lb., having a round or basin-shaped lower surface, a level top and a projecting piece like a handle, and called "ham bone" from this shape. It is evidently an accumulation from the manufacture of wrought iron. Photomicrographs show ferrite with iron sulphide and pearlite in patches.

The Isthmian Canal Commission has just awarded to the Ingersoll-Rand Company the contract to furnish three large direct connected, electrically driven air compressors of the duplex type, embodying the new Ingersoll-Rogler valve. The combined capacity of these units will be 10,000 cu. ft. They will be installed at the Balboa shops, where the air will be used for general repair work in the shops and also on the new dry dock, forming part of the permanent canal equipment.

Durability of Iron and Steel Tanks

The Chicago Bridge & Iron Company, Chicago, which has built in the aggregate about 3000 steel tanks, largely for municipal, railroad and industrial water service, recently undertook to gather information regarding the state of preservation of such tanks after varying periods of service. From information secured concerning the iron and steel standpipes built in the United States prior to 1890, of which a practically complete list was had, the subjoined tabulation was made. In most instances the period of service was terminated by changing conditions rather than the condition of the standpipe.

Year built	No. of tanks	No. in service	No. taken down	Date	Condition of steel
Before 1860.....	4	2	1	1890	Good
			1	1910	Good
1860-1870.....	3	1	1	1904	Good
			1	1907	Good
			1	1904	Good
			1	1908	Good
1870-1880.....	19	13*	1	1909	Good
			1	1911	Good
			1	1912	Good
			1	1913	Good
1880-1890.....	21	21*	..	....	....
Total.....	47	37	10	....	....

* 1 in bad condition.

The first tank included in the table was erected in 1836 at Lancaster, Pa. It was 5 ft. in diameter and 75 ft. high. It was taken down to be replaced by a tank of larger diameter. The next was at Louisville, Ky., in 1857. It was 4 ft. in diameter and 195 ft. high. It is still standing, although it has not been used for the last three years due to changes in operating conditions. It was in active service for 57 years. A tank built at Allentown, Pa., in 1860, which was 7 ft. in diameter and 76 ft. high, was taken down in 1910 after 50 years of service. The plates were in good condition at the end of that time, the change being made on account of operating conditions. A tank built at the Ohio Penitentiary at Columbus, Ohio, in 1859, which is 10 ft. in diameter and 100 ft. high, is still in service. The list includes five railroad tanks, one of which was built at the Forty-second street shops of the Chicago, Rock Island & Pacific, in Chicago, in 1867. This tank is made of 3/16-in. metal and is still in service and apparently in good condition.

The F. C. Carpenter Drafting & Engineering Company, Hartford, Conn., has brought out a chart for giving the angles, the area and two remaining sides of a right triangle, when the base is known. The chart consists of a circle on a square piece of cardboard and a movable semi-circular piece. The curved edge of the movable piece is graduated to correspond to angles from 45 to 90 deg., while the straight edge has sets of graduations for bases from 0 to 10 in. in length. One-half of the circle has graduations for angles from 0 to 45 deg., and by placing 45 deg. on either scale to the given angle, the opposite angle is read opposite the 45-deg. mark on the other scale. By locating the proper length on the base scales the other sides and the area can be read on the radial scales and curves.

The Electric Welding Products Company, Cleveland, Ohio, on April 1 will reduce the working hours in its plant from 10 to 9 hours a day and will readjust its wage scale so that employees will receive the same pay for a 9-hr. day as they do at present for 10. Foremen will be placed on a salary basis, receiving for a 9-hr. day pay equal to what they are getting at present on an hourly basis for 10. They will also be allowed two weeks' vacation each year with full pay and will not be charged with time off owing to sickness.

Burlington Steel Company, Ltd., is the new name of the Canada Steel Company, Ltd., Hamilton, Canada. The change has been made because of the similarity of names of several Hamilton companies and the confusion resulting therefrom. The company manufactures steel bars, bands, angles, channels, tees, etc., making a specialty of steel bars for the reinforcement of concrete.

Steel Corporation Benzol Recovery Plant

The United States Steel Corporation decided this week to make extensive improvements and additions at the by-product coke plant at Farrell, Pa., operated by the Carnegie Steel Company. By-product recovery is to be carried further than is now done at any of the Steel Corporation's coking operations, and the new construction will include a benzol recovery plant of the Carl Still type. The expenditure involved in the improvements will be close to \$500,000.

Lehigh Valley Safety Campaign

W. H. Cameron, Chicago, secretary and treasurer of the National Council of Safety, addressed 1200 persons at Easton, Pa., on Friday evening, March 20, in the interest of the association's work. The audience was largely composed of manufacturers and workmen from points in the Lehigh Valley. The lecture was illustrated by numerous lantern slides, and safety appliances in a number of industries were shown. It was stated that since the starting of the safety first movement there has been a reduction of 50 to 75 per cent. in the number of accidents in manufacturing establishments having safety departments. Ralph H. Sweetser, president of the Thomas Iron Company, presided at the meeting and W. F. Roberts, general superintendent of the Bethlehem Steel Company, who is president of Lehigh Valley Council No. 5, of the associated safety organizations, told of what had been done as the result of the latest organized effort of manufacturers. Lehigh Valley Council No. 5 now has a membership of 28 companies which employ many thousands of men.

Wear in bearings lubricated with castor oil was discussed in a recent letter to London Engineering, by Smith, Major & Stevens, Ltd., Abbey Works, Northampton, England. In the case of one side of the teeth of a cast-iron worm wheel, which had been in operation for 11 yr. in a passenger elevator in Newcastle-on-Tyne, the loss of thickness amounted to 0.008 in. and on the other side to 0.006 in. The worm working into this wheel is of mild steel, and while the wear on this could not be measured directly, the total back-lash indicated that it did not amount to more than 0.01 in. on each surface. The letter states that the castor oil used in the bearings did not work the least degree of injury, as no mirror ever exhibited a higher polish than did these surfaces working in a castor-oil bath.

The Ma'estic Stove & Range Company, St. Louis, has announced a profit-sharing system for its employees. Under the plans of President R. H. Stockton and his chief associate in stock ownership, Mrs. L. L. Culver, a distribution of about \$10,000 was made March 17. All in the employ of the company for more than two years were included and the amounts ranged from \$180 to \$10, being based on the length of service with the company. Some of the beneficiaries had been with the company 23 years and those with a record of 12 or more were given the maximum. A half holiday was also given on the day of the distribution, which, it was stated, will become an annual affair. The company has the record of never having had a strike of any kind.

The Bethlehem Steel Company has had for some time in readiness for operation at South Bethlehem, Pa., its new 500-ton blast furnace, known as A furnace, erected on the site of old No. 2 furnace. It is 22 ft. x 90 ft., with five 22 ft. x 100 ft. McClure stoves, and is equipped with two 42 x 60-in. Bethlehem gas-driven blowing engines. Furnace C, which was one of two old 200-ton furnaces, has been dismantled and a new stack of the size of furnace A is under construction in its place.

The longest tunnel on this side of the Atlantic has been started by the Canadian Pacific Railway at Mt. McDonald, Canada. It will be a little over five miles long with a 1700-ft. approach on the west side and a 2600-ft. approach on the east side.

The Machinery Markets

The markets are not by any means devoid of encouraging features, but in no marketing center has there been any pronounced deviation from the quiet of recent months. Single and scattered orders have been the rule in New York, although at least two good recent sales are recorded. In New England the market for machine tools drags, but the dullness does not prevail in some other metal trade lines. Cleveland has felt a little improvement, particularly in the number of single tool inquiries, while the automobile trade promises some better buying. Cincinnati is more cheerful because of a better demand for two or three types of machine tools and an improved prospect for exports, despite the fact that foreign buying is now quiet. In Detroit there is considerable miscellaneous inquiry, but it closes slowly and there are not many indications of immediate change. In Chicago no new business of importance has developed, and in getting small orders extremely sharp competition is encountered. The Milwaukee market is dull and about the only feature is the prospect of a small railroad list. In Indianapolis the number of manufacturing enterprises which are being incorporated is on the increase. Most lines are quiet in the Central South, although wood-working machinery is fairly active. The St. Louis machine market shows no change, although new enterprises are increasing in number. The demand for machinery is dull in Birmingham, but activity in building indicates future business. From Texas the report is that the machinery and tool trade is satisfactory. In the Pacific Northwest some districts have been upset by strikes in the lumber mills, but there is nevertheless fair activity, including heavy shipments to Alaska and British Columbia. Conditions in the San Francisco territory are somewhat less favorable, inasmuch as action on important inquiries is held up, but mining machinery is active and interest is lively in equipment for reclamation work.

New York

NEW YORK, March 25, 1914.

Local conditions have undergone little if any change and transactions involving but one or two machines make up the bulk of business. Inquiries have slowed up a little, but there are sufficient out to create plenty of activity when they come to an issue unless spread over too long a period. While the trade as a whole is quiet the monotony is occasionally varied by transactions of real importance. One of these was an order recently placed for upward of 50 automatic machines. Another good piece of business, though one which did not run into such large figures, was the purchase of several large turret lathes by the Dunlop Wire Wheel Company, Long Island City. The orders for these machines went to two manufacturers and it is understood that some other equipment has been purchased. Automatic and semi-automatic machine tool makers have enjoyed the greater part of what business has been stirring of recent date. The Eastern railroads have not as yet raised the embargo upon action by their purchasing departments.

The Central Clay Products Company, North Tonawanda, N. Y., has increased its capital stock to \$100,000 and will use some of the additional funds for improvement to its factory at Beach Ridge.

The Dutchess Foundry Company, Poughkeepsie, N. Y., has been incorporated with a capital stock of \$10,000, by Joseph Dufour, J. C. VanZile and William Wagnitz.

The Buffalo Forge Company, Buffalo, manufacturer of forges, blowers, etc., is planning to expend approximately \$500,000 in extensive additions to be made to its plant and equipment at Broadway, Mortimer and Tousey streets, having acquired about two blocks of adjoining property. The addition to the main building will be 7 stories and basement, 350 ft. in length, of steel, brick and concrete construction. Another addition, 200 x 280 ft., will be erected. A large amount of heavy machinery tools and special equipment will be installed in the new building next summer.

The Eagle Brewing Company, Utica, N. Y., will erect a 2-story-and-basement bottling house, 45 x 105 ft., of steel, brick, terra cotta and concrete construction.

The town of Bath, N. Y., will issue bonds to the amount of \$50,000 for the purposes of building and equipping an electric light plant.

Henry W. Taylor, engineer, 100 State street, Albany, has completed plans for a waterworks system for the city of Sidney, N. Y., to be built at an estimated

cost of \$125,000. William Thorp, city clerk, will probably receive bids for construction in about six weeks.

The R. T. Ford Company, Rochester, was low bidder at \$311,607 for furnishing and laying eight miles of steel pipe for the new waterworks conduit which is to connect Hemlock Lake with Rochester.

The extensive printing plant of the J. W. Clement Company, Exchange, Ellicott and Carroll streets, Buffalo, was partially destroyed by fire March 20, doing much damage to a large equipment of valuable machinery—presses, cutters, trimmers, etc.—some of which will have to be replaced.

The Watertown Woolen Products Company, recently organized at Watertown, N. Y., to manufacture high grade woolen blankets from discarded paper mill felts, will shortly be incorporated with a capital stock of \$50,000, and build a manufacturing plant in that city. Max Statinsky is president of the company and Jacob Baker and Jacob Statinsky, directors.

The Niagara Silk Mills Company of Buffalo and Tonawanda, N. Y., is having plans prepared for a Canadian branch factory which it will erect at Brantford, Ontario. The first building of this new plant will be 52 x 165 ft., three stories and basement.

The Pratt & Letchworth Company, Buffalo, has completed plans for a service building 70 x 144 ft., 30 ft. in height, of brick and steel, which it will add to its plant at Tonawanda street and the New York Central Railroad.

The National Fireproofing Company, Broadway and Twenty-third street, New York City, has received the contract to erect a seven-story factory, reinforced concrete, at Duffield street near Willoughby, Brooklyn, for Towns & James, 174 Fulton street, Brooklyn, manufacturing chemists.

John Boese, Bridge plaza, Long Island City, N. Y., has completed plans for a factory, 75 x 150 ft., six stories, reinforced concrete construction, to be erected for the C. A. Willey Company, paint manufacturer, Vernon and Nott avenues, at an estimated cost of \$125,000.

The Moore Automatic Fire Escape Company, Flatiron Building, New York City, has been incorporated to manufacture an automatic fire escape. It will build a factory in Passaic, N. J., but details of development have not been settled on. E. T. Moore is president.

The Bullet Brand Distributing Company has been incorporated with a capital stock of \$50,000 by P. E. Fuller, New York City, and others of Wilmington, Del., for the manufacture and sale of a bullet brass container. John Craner, care of Oppenheim & Co., Trinity Building, New York City, should be addressed.

The Rock Plaster Mfg. Company, 381 Fourth avenue, New York City, is in the market for the following equipment for its new factory at 150th street and East River: Broughton mixers, barrel packers and a large amount of shafting, pulleys, belts, etc.

The South Electric Mfg. Company, 165 Broadway, New York City, has been incorporated to manufacture inclosed fuses, cutouts, junction and subway boxes, surface boxes and other electrical specialties. William D. Ligon, 165 Broadway, is president. Information concerning the plant and equipment is not available.

It is estimated that approximately \$200,000 will be required for water supply improvements, including a booster pump, for Perth Amboy, N. J.

Philadelphia

PHILADELPHIA, PA., March 23, 1914.

The Philadelphia Steel & Forge Company, Tacony, Philadelphia, has completed the construction of a one-story laboratory. Contracts for the equipment have been placed.

The Powers-Weightman-Rosengarten Company, Ninth and Parrish streets, Philadelphia, manufacturing chemist, is building a seven-story factory of reinforced concrete. The William Steel & Sons Company is the contractor.

The American Bar Lock Company, Twenty-sixth street and Pennsylvania avenue, Philadelphia, manufacturer of vaults, floor lights and skylights, will erect a factory in Long Island City, N. Y., 75 x 180 ft., one story. Details regarding equipment are lacking. Balingier & Perrot are the architects.

The Doylestown Agricultural Company, Doylestown, Pa., has awarded the contract for its new building and purchased most of the machinery equipment.

The End-Oxy Appliance Company, Trenton, N. J., has been incorporated by Carl H. Endebrock and others, for the manufacture of oxygen decarbonizing outfits for automobile use, oxy-acetylene welding and cutting appliances, etc. Manufacturing plans for the present are indeterminate, and the output will meanwhile be manufactured under contract.

The Johns Hopkins University, Baltimore, is erecting a power plant at a cost of \$50,000. Parker, Thomas & Rice, Union Trust Building, Baltimore, are the architects, and Charles L. Stockhausen, Marine Bank Building, Baltimore, is the contractor.

New England

BOSTON, MASS., March 24, 1914.

The machine tool market drags somewhat; in fact, it is dull. Some other lines of machinery are more active, and so, also, are not a few of the factories which use machine tools in the manufacture of metal specialties. Everyone is hoping that the spring months will show an improvement, and in some cases the seasonable effect is already apparent.

Potter, Johnston & Gridley, Ltd., have incorporated under the laws of Rhode Island, with capital stock of \$350,000, the purpose being to take over the British patents of the Potter & Johnston Machine Company, Pawtucket, R. I., and of the Windsor Machine Company, Windsor, Vt., and to establish works in Great Britain which will build the Potter & Johnston and Gridley machines for the English market. The incorporators are James C. Potter, W. Wallace Potter and John Johnston, Pawtucket, and George O. Gridley and Frank L. Cone, Windsor. Plans have been prepared for shops which will be erected in Birmingham.

Pratt, Read & Co., Deep River, Conn., ivory cutlers and manufacturers, have not placed contracts for the equipment of their new factory building and power house which has been alluded to. The requirements comprise engines, generators and boilers, an exhaust system for removing shavings, and the heating and sprinkler systems. The factory will be 63 x 165 ft., with wing 40 x 48 ft., all four stories, and the power house 40 x 68 ft., one story.

The Austin Organ Company, Hartford, Conn., will

build an additional factory, 48 by 139 ft., three stories, of mill construction, with steel trusses.

A dispatch from Springfield, Mass., states that the New England Power Company will spend about \$1,000,000 this year in the development of 30,000 hp. as an additional hydroelectric unit on the Deerfield River. Applications for this power have already been received to guarantee its purchase for use in the cities and towns of western Massachusetts and northern Connecticut.

Coffin Bros., New Bedford, Mass., will build a large addition to their box factory.

Announcement is made at Springfield, Mass., that the American Wrench & Bolt Machine Company has purchased land in East Springfield, near the works of the Hendee Mfg. Company, and will erect a factory on the premises.

The Whitcomb-Blaisdell Machine Tool Company, Worcester, Mass., has brought out a planer, known as the 17-in. by 20-in., which replaces the company's 17-in. by 17-in. machine. The new model has increased weight throughout and various improvements in mechanical features, which changes combine to meet the demands of the most modern machine shop practice. The machine is intended not only for tool room service but for manufacturing within the limits of its capacity.

The brass foundry at Norfolk Downs, Mass., owned by Edgar Norton, Holbrook, Mass., has been sold to a new corporation known as the Rolino Metal Company.

The Richford Mfg. Company, Richford, Vt., manufacturer of furniture, will build an addition 48 x 51 ft., three stories.

Chicago

CHICAGO, March 23, 1914.

Local machinery dealers are finding practically no new business of an importance sufficient to break the routine of single tool orders which are themselves none too plentiful. The prolonged absence of substantial business has made even the more insignificant inquiries the occasion for sharply competitive bidding.

The Peerless Tool Company, Chicago, has been incorporated with a capital of \$25,000 to manufacture and market special tools and machinery. The organizers are S. H. Rosenberg, 127 North Dearborn street; Samuel Peterson and D. H. Stapp.

W. L. DeWolf & Co., 110 South Dearborn street, Chicago, have had plans prepared for the erection of a four-story manufacturing building at Adams and Aberdeen streets.

The Goldsmith Bros. Smelting & Refining Company, Throop and Fifty-ninth streets, Chicago, is building a two-story addition, 40 x 67 ft., the expected cost to be \$13,000.

The Barco Brass & Joint Company, 230 North Jefferson street, Chicago, has had plans prepared for additional factory capacity.

The Chicago Steel Cabinet Company, Chicago, organized by Thomas J. Hickey, attorney, 38 South Dearborn street, with a capital of \$5000, will manufacture metal goods of the general character indicated by the corporate name.

Joseph S. DeBelka, 29 South LaSalle street, Chicago, has prepared plans for an armory for the Eighth Regiment, the building to be of reinforced concrete construction and to cost \$200,000.

The American Can Company, Chicago, has awarded the contract for its new Chicago factory to the Mueller Construction Company. The buildings will be three stories, 180 x 280 ft., of reinforced concrete construction and will cost \$150,000.

The Watrous-Acme Mfg. Company, Chicago, has been incorporated with a capital of \$100,000 by James V. Hickey, 105 South LaSalle street, J. Walter Stead and Frederick Secord.

The National Stamping & Electric Company, Chicago, has tendered a bid of \$20,150 for the equipment and merchandise of the Acorn Brass Mfg. Company, Aurora, Ill., a court sale of which has been ordered.

Ernest J. Knight and William Keasler, Aurora, Ill., have purchased the National Cycle Accessories

Company in that city. The company will make a specialty of manufacturing cyclecar wheels.

The Frantz Mfg. Company, Sterling, Ill., manufacturer of building hardware, has had plans prepared for a three-story brick and mill construction factory which will treble its present capacity. All machinery in the new plant will be electrically driven.

The Sundstrand Adding Machine Company, Rockford, Ill., is being organized with a capital of \$150,000. The organizers have thus far conducted the business which the new company will handle from the plant of the Rockford Milling Machine Company.

Fred Weineck and W. Summerhays, Waterloo, Iowa, are repairing, enlarging and equipping a building to be used as a foundry.

The Charles City Engine Company, Charles City, Iowa, is rapidly completing an addition to its plant to be used as a foundry. New equipment is to be installed.

The Kerrihard Company, Red Oak, Iowa, is building an addition, 70 x 90 ft., to afford increased manufacturing capacity for its line of pumps and tanks. New molding machines and plate machinery are to be installed.

The Structo Mfg. Company, Freeport, Ill., manufacturer of mechanical toys, has purchased a larger factory building in that city.

The board of prison industries, Springfield, Ill., Ralph R. Tilton, secretary, will receive bids until April 6 for equipment for additional capacity in the stone crusher plant at the Joliet penitentiary, including two stone crushers, auxiliary type, elevators, screens, spouts, electric motors for power and also a switch engine and a steam shovel fully equipped.

The plant of the American Shoe Stock Company, Centralia, Ill., has been destroyed by fire with a loss of about \$30,000 in equipment. The plant will be rebuilt.

C. Howard Parsons, architect, 601 Phoenix Building, Minneapolis, Minn., has drawn plans for a school building, 88 x 129 ft., at a cost of \$20,000. The equipment includes a manual training department.

The town of Arlington, Minn., will sell bonds amounting to \$14,000, for the construction of a waterworks.

The town of Waucoma, Iowa, will erect a municipal electric plant to be operated by water power. An issue of \$12,000 of bonds was voted to cover the cost of installing the plant.

The supervisors of Muscatine and Louisa Counties, Muscatine, Iowa, will meet April 14, to receive bids for the pumping plant for district No. 13. The previous award of contract for this work to the McDonald Engineering Company, Chicago, has been rescinded. In calling for new bids, both electrical and steam equipment will be specified.

The town of Bloomfield, Iowa, will issue \$15,000 of bonds to rebuild and improve the electric light plant.

E. W. Gilbertson, Devils Lake, N. D., will receive bids for a complete electric lighting plant, including 15 hp. gasoline engine and 8 or 10 kw. generator.

Detroit

DETROIT, MICH., March 23, 1914.

No change of any importance is noted in the local machinery market; business is still mostly of the single tool variety and sales are not heavy. A fair amount of miscellaneous inquiry is before the trade, but business closes slowly and the outlook does not indicate any considerable gain in activity. Metal-working plants are fairly well occupied, but it is a significant sign of the trend of business that extensive additions to equipment are few and that many plans for extension of plants which were being considered last year are being held in abeyance. The demand for castings remains about the same, foundries being operated at about 60 per cent. capacity. A fair volume of new building is reported, but its character is such that the machinery trade is only indirectly interested.

Pelton & Crane, Detroit, manufacturers of electrical supplies, have placed contracts for the erection of a

three-story brick factory at Harper avenue and Antoine street.

The National Concrete Stone Company, Detroit, has been incorporated with a capital stock of \$20,000, and has acquired a large factory site and will at once proceed with the erection of a plant with a capacity of 2,000 blocks a day.

The River Raisin Paper Company, Monroe, Mich., has issued \$250,000 in bonds, the proceeds of a large part of which will be used to provide for the erection of a new fibre board mill. The company estimates the cost of the new mill at approximately \$175,000.

The Schust Baking Company, Saginaw, Mich., has increased its capital stock from \$50,000 to \$150,000 to provide for the erection of a five-story manufacturing building, 80 x 130 ft. and a power house, 40 x 40 ft. Modern baking and power equipment will be installed.

The village of Grandville, Mich., has voted to bond for \$12,000 to provide for the establishment of a water works system.

The William Guillot Gasket Company, Midland, Mich., has been incorporated with \$25,000 capital stock to manufacture metal gaskets, washers and other specialties. A factory will be erected at once. William Guillot and Charles Brown are the principal stockholders.

The Flagler Cyclecar Company has completed negotiations with the chamber of commerce, Cheboygan, Mich., to establish its factory in that city. The company has secured temporary quarters, but a new manufacturing plant is contemplated.

The Acme Surgical Instrument Company, Grand Rapids, Mich., has been incorporated with \$20,000 capital stock to manufacture surgical appliances. C. A. Linderholm, F. G. Dang and E. E. Jameson are the incorporators.

The Lakey Foundry & Machine Company, Muskegon, Mich., has been incorporated with \$50,000 capital stock by W. B. Lakey, Otto G. Meeske and Fred Rodgers. The new company, which will manufacture automobile castings and special machinery, has acquired the plant of the defunct Rodgers Iron Mfg. Company, and will install a considerable amount of new machine shop and foundry equipment.

The Mount Clemens Pottery Company, Mount Clemens, Mich., will erect a factory. Charles Doll is manager.

The Diamond Crystal Salt Company, St. Clair, Mich., will erect a five-story addition to its plant, 92 x 100 ft., to cost \$150,000.

The plant of the Saginaw Ladder Company, Saginaw, Mich., was destroyed by fire March 16, entailing a loss of \$35,000. Plans for rebuilding have not yet been decided upon.

The Valley Boat & Engine Company, Saginaw, Mich., manufacturer of motor boats, has increased its capital stock from \$30,000 to \$75,000.

The Nichols & Shephard Company, Battle Creek, Mich., manufacturer of threshing machinery, has increased its capital stock from \$55,000 to \$2,200,000. The increase is in the nature of a stock dividend.

Referring to the item which appeared on page 761 in *The Iron Age* of March 19 that "the State Foundry Company, St. Johns, Mich., has filed a voluntary petition in bankruptcy," we are advised by the St. Johns Foundry Company that this does not apply to that company. The publication of the item has caused the St. Johns Foundry Company some annoyance, which is regretted.

Cleveland

CLEVELAND, OHIO, March 23, 1914.

The condition of the local machine tool market shows some improvement. While there is not much change in actual orders a fairly good volume of inquiry for single tools has sprung up. The only order of any size reported is one placed by an Ohio maker of automobile accessories for about a dozen machines. The interest of several machine tool builders is centered in the prospective requirements of the Hudson Motor Car Company, Detroit, Mich., which has under consideration the manufacture of motors used in its cars.

While it is stated that a definite decision has not yet been reached, if the company does decide to make its motors it will require considerable additional machine tool equipment, and this is now being figured on.

The Chicago-Cleveland Car Roofing Company, Cleveland, manufacturers of metal roofs for cars, will establish a plant in Warren, Ohio, where a nine-acre site has been acquired. Plans for the plant are being prepared by the W. S. Ferguson Company, Cleveland. There will be a main building, 150 x 300 ft., and some small buildings.

The National Heater Company, Cleveland, which was recently incorporated with a capital stock of \$100,000, will place on the market a new line of heating boilers. A. L. Stowell, formerly connected with the Cleveland office of the American Radiator Company, and later with the Chafer Company, heating engineer, is one of the prime movers.

The Allyn-Ryan Foundry Company, Cleveland, will enlarge its plant by the erection of a two-story brick addition, 112 x 120 ft.

The Madison Foundry Company, Cleveland, will shortly begin the erection of a plant to take the place of the one recently burned. The plant will be divided into two sections, one 59 x 120 ft., and the other 45 x 97 ft.

The Peters Machine & Mfg. Company, Cleveland, has increased its capital stock from \$25,000 to \$75,000.

The Cleveland Tap & Tool Company, Cleveland, recently incorporated with a capital stock of \$20,000, is planning to place on the market a threading tool and spring die, and expects to establish a manufacturing plant in this city. H. J. McGovern is one of the men largely interested in the new company.

The Modern Caster Company, Cleveland, has been incorporated with a capital stock of \$5,000 by W. J. Ockington, M. J. Geiss, and others, to manufacture metal specialties.

The Ford Motor Company, Detroit, which some time ago acquired option on a site in Cleveland, now has under consideration the building of an assembling plant and service station at Euclid avenue and East 117th street.

Knox & Elliott, architects, Rockefeller Building, Cleveland, have drawn plans for a power plant, printing shop and other buildings for the Mooseheart Vocational School and Farm, Mooseheart, Ill. The buildings will be one, two and three stories, concrete and steel. E. C. Lane, Batavia, Ill., should be addressed.

W. S. Lougee, Marshall Building, Cleveland, has plans for a factory, 50 x 100 ft., two stories, brick construction, to be erected at Madison, Ohio, for the William Edwards Company, 1300 West Ninth street, Cleveland.

The Osborn Mfg. Company, 5401 Hamilton avenue, Cleveland, will build a three-story factory. Christian Schwarzenberg & Gaede, 1900 Euclid avenue, are the architects.

The Monarch Metal Mfg. Company, Kansas City, Mo., will move to Canton, Ohio, where a plant will be erected on a five-acre site near the plant of the Republic Stamping & Enameling Company. The plant will be 80 x 460 ft., one-half two stories high and the remainder one story, of brick and reinforced concrete construction. The company makes metal doors, sash and other sheet metal building products. The location of the plant in Canton was secured through the efforts of the local board of trade, which gave the company a bonus of \$15,000.

The city of Springfield, Ohio, will buy a pump for the water works at an estimated cost of \$6500.

The Toledo Pipe Threading Machine Company, Toledo, Ohio, which recently acquired a site on Summit street, in that city, for a new plant, will erect a two-story building, 40 x 120 ft., and a one-story building, 100 x 120 ft. The buildings will be of concrete and steel construction.

The Alliance Structural Company, Alliance, Ohio, has been incorporated with a capital stock of \$100,000 by G. W. Schem, B. J. Hier, C. C. King, D. Kendall and G. A. Carter.

The Air Cell Washer Company, Toledo, has been incorporated with a capital stock of \$10,000 by H. A.

Huntingger, and others, to manufacture washing machines.

It is announced that the McNaull Auto Tire Company, Toledo, Ohio, will build a new plant. The company has increased its capital stock from \$75,000 to \$175,000.

The Fulton Forging Company, Canal Fulton, Ohio, will enlarge its plant and install two additional hammers, which are to be purchased shortly.

Milwaukee

MILWAUKEE, Wis., March 23, 1914.

The machinery business situation is unchanged. It is featureless and disappointment is expressed at the failure of some good prospective business to materialize. Buyers are waiting and purchases are light and mostly for single tools. The Chicago & Northwestern Railway is reported ready to establish division shops at Green Bay, Wis., which will need a small list. Builders of special machinery report good business. Used machinery lines are dull and it is considered fortunate that stocks are not growing. This would also indicate that fewer replacements are being made than usual. General conditions are hardly as satisfactory as might be wished for.

Bids have been received by Klug & Smith, Mack Block, Milwaukee, for the erection of a factory for the Milwaukee Grinder & Specialties Company, 90 x 120 ft., one story and basement, brick construction, to be erected at Twenty-second and Sycamore streets and Pettibone place. This building is only one of several which it will eventually erect.

Fred G. Simmons, commissioner of public works, Milwaukee, Wis., closes bids March 30 for furnishing and installing two 300-hp. water-tube boilers in the North Point pumping station.

The Nunn & Bush Company, Milwaukee, Wis., which established a boot and shoe manufactory in the Kopmeier Building, 409-419 Third street, will build its own plant. Plans will call for a 6-story reinforced concrete factory, 50 x 140 ft., with a 35 x 40-ft. wing, to cost about \$75,000. Henry L. Nunn is manager.

Vaughan, Meyer & Sweet, consulting engineers, Milwaukee, have been engaged by the State Board of Control, Madison, to prepare plans for the power plant, heating, lighting, ventilating and cleaning system for the new Industrial Home for Women at Taycheedah, Fond du Lac County, Wis. M. J. Tappins, Madison, Wis., is secretary. The same engineers are completing plans for heating and lighting systems in addition to the State tuberculosis sanatorium at Wales, Wis., and the addition to the hospital for criminal insane at Wau-pun, Wis.

The department of public works, Milwaukee, Wis., will receive bids until March 30 for boilers for the pumping station.

The Milwaukee-Western Electric Railway Company, Milwaukee, expects to complete the grading work on its proposed lines from Milwaukee to New Butler, Wis., and northwest, by April 15, so that actual construction may be started by May 1. Purchases of material and equipment are now being made. J. W. Barber, Milwaukee, is secretary.

Arrangements are being made by the Chicago & Northwestern Railway to establish car shops and locomotive repair and rebuilding works at Green Bay, Wis., an important northern division point. It is the intention to build several structures.

Coakley, Young & Co. is the name of a new firm organized at Beloit, Wis., to manufacture mercury gasoline gauges and other automobile and garage appliances. A small shop is being equipped.

The Williams Engine & Clutch Works, Beloit, Wis., has filed notice of dissolution as a corporation. C. H. Morse, Jr., is the chief stockholder and acted as president.

Lockwood & Greene, structural engineers, Chicago, Ill., awarded the contract for structural material for the \$100,000 factory addition to the shops of the Hamilton Mfg. Company, Two Rivers, Wis., to the Wisconsin Bridge & Iron Company, Milwaukee. The requirement is 362 tons. Other contracts are now being closed.

F. S. Hebden, Toledo, Ohio, of the engineering staff of the Railway Materials Company, Chicago, is in charge of plans for remodeling and re-equipping the former Wisconsin Central car and locomotive shops at Stevens Point, Wis., as a brake shoe foundry and finishing shop. The present main building is 122 x 194 ft. The power plant will be made into an administration building and all machinery and tools driven by electric motors with current from the Stevens Point Lighting Company. W. H. Simpson, Chicago, is president.

The malthouse, power plant and other buildings of the M. H. Pettit Malting Company, Kenosha, Wis., were burned March 18. It is planned to rebuild without delay. The loss is estimated at \$175,000.

The city of Two Rivers, Wis., is about to issue bonds to the amount of \$40,000 to provide for building a new pumping plant.

The Gasoline Turbine Motor Company, Racine, Wis., has been incorporated by John B. Simmons, John H. Morgan and Mort E. Walker.

The city of Sheboygan Falls, Wis., has voted \$9000 in bonds for an electric light plant.

Edward Kozick, architect, Uihlein Building, Milwaukee, is preparing plans for improvements to the plant of the Gutsch Brewing Company, Sheboygan, Wis., to cost \$35,000. The work includes the construction of a tunnel, addition to power plant, enlargement of refrigeration plant and new racking building.

The Municipal Light, Power & Water Company, Bayfield, Wis., will purchase two direct current, 2300 volt, 60 cycle generators, one motor driven pump and miscellaneous electrical supplies.

John W. Benzel, Ripon, Wis., is establishing a factory for the manufacture of concrete forms.

John D. Chubb, architect, Chicago, Ill., has been commissioned to prepare plans for the proposed new \$200,000 manual training building to be erected as an addition to the Stout Institute at Menomonie, Wis.

George W. Jagers, Racine, Wis., has organized the George W. Jagers Mfg. Company, in that city for the manufacture of automobile engines. He has acquired the shop of the Wadewits Machine Company.

Indianapolis

INDIANAPOLIS, IND., March 23, 1914.

The Indianapolis Belting & Supply Company will have a new three-story building, 70 x 135 ft., reinforced concrete, at 32-36 South Capitol avenue.

The Indiana Die Casting Development Company, Indianapolis, has changed its name to the Indiana Die Castings Company.

The American Rotary Valve Company, Chicago, having a plant in Indiana, has increased its capital stock from \$750,000 to \$1,000,000.

The Clark Crank Company, Indianapolis, has been incorporated with \$75,000 capital stock to manufacture machinery. The directors are William R. Clark, Glen R. Funk and T. H. Miller.

The Standard Safety Tank Company, Indianapolis, has been incorporated with \$50,000 capital stock, to manufacture tanks, cans, buckets, etc. The directors are Joseph Ridings, Henry F. Schoen and Charles B. Henkle.

The Oglesby Stove & Furnace Company, Frankfort, Ind., has been incorporated with \$25,000 capital stock to manufacture stoves, etc. The directors are Arthur Ramey, Oscar S. Miller and Granville W. Sharp.

The Wabash Foundry Company, Wabash, Ind., has been incorporated with \$50,000 capital stock to operate a foundry. The directors are Nelson G. Hunter, James I. Robertson and Charles H. Haas.

The Hornsbarger Transformer Company, Lafayette, Ind., has been dissolved.

The Risley Brick Company, Michigan City, Ind., has been incorporated with \$60,000 capital stock to manufacture brick. The directors are William B. Hutchinson, Charles W. Hotchkiss and Walter J. Riley.

The American Valve & Tank Company, Indianapolis, has been incorporated with \$100,000 capital stock, to manufacture valves, tanks and similar appliances. The directors are Frank Shellhouse, William M. Frazee,

Charles A. Wulp, William J. Henley and John L. Baker. The Crawfordsville Tank Company, Crawfordsville, Ind., has dissolved.

The Logansport Heating Company, Logansport, Ind., will erect a plant to cost \$35,000.

The National Gate Company, Rushville, Ind., recently incorporated with \$20,000 capital stock, has plans for a factory to manufacture a patented gate.

The LaPorte Mat & Mfg. Company, LaPorte, Ind., has awarded the contract for its factory, 45 x 105 ft., one story, brick construction, including boiler house.

Cincinnati

CINCINNATI, OHIO, March 23, 1914.

Reports from machine tool dealers are a trifle more cheerful than those from manufacturers. Considerable business is being figured on, but only a relatively small part of it is being closed. There appears to be a better demand for medium-sized lathes than for any other kind of tools, although manufacturers of shapers have lately come in for a fair share of business. From many sources it is reported that the export trade is quiet, but several local tool builders state that the outlook is better than for some time. Wood-working machinery is holding its own, while metal-working equipment is also in fair demand. The jobbing foundries are still operating on short time.

The United States Paper Goods Company, Cincinnati, has purchased the old plant of the Globe Wernicke Company, on West Eighth street, and will move there at an early date. Additional machinery will be required.

The American Oil Treating & Hardening Company, Cincinnati, has been incorporated with \$500,000 capital stock, and will erect a plant in St. Bernard suburb. In case the company's present plans are carried out, power plant and other equipment will be needed. Starbuck Smith is one of the principal incorporators.

The Cincinnati Iron & Steel Company, Cincinnati, has lately secured the contract for approximately 3000 tons of reinforcing concrete steel for the Hopple and Ludlow streets viaducts. The Kirschner Construction Company will have the work in charge.

A small amount of electrical and other equipment will be required for a canning factory to be operated by the Liberty Cherry & Fruit Company, at Eighteenth and Washington streets, Covington, Ky. Edgar Bettman, Cincinnati, is one of the principal incorporators of the company.

L. J. Wittman, Hamilton, Ohio, contemplates establishing a wrecking and salvage plant at Middletown, Ohio. Only a small amount of additional equipment will be needed.

The John R. Stevens Contracting Company, Cincinnati, has been awarded contract for a large distilling plant and grain elevator to be erected for the William P. Squibb Distilling Company, Lawrenceburg, Ind.

The Western Water Motor Company, Oxford, Ohio, has been organized to manufacture washing machines and water motors. Very little machinery will be required, but the company is in the market for a supply of cap screws, bolts, brass fittings, hose, etc.

The Diamond Light Company, Cincinnati, has been incorporated with \$3000 capital stock to furnish light and power for two theatre buildings. A small lighting plant will be established in the Gayety Theatre basement. R. K. Hynicka is one of the incorporators.

The Ohio Wax Paper Company, Columbus, Ohio, is a new incorporation with \$60,000 capital stock, and will open a paper factory at an early date. Nothing is known as to the machinery requirements. John B. Kline, Jr., is named among the incorporators.

The City Ice Company, Columbus, Ohio, will install ice-making and refrigerating equipment. The company was recently incorporated with \$15,000 capital stock by J. M. Elliott and others.

The Louisville Machine Company, Louisville, Ohio, has increased its capital stock from \$10,000 to \$25,000, and will probably add to its manufacturing facilities at an early date.

The Batavia Ice Company, Batavia, Ohio, will need additional equipment for increasing the capacity of its plant.

Wheeling

WHEELING, W. VA., March 23, 1914.

Many mills of the Wheeling district are storing coal in anticipation of a miners' strike. At its Riverside plant, the National Tube Company is utilizing all its available space in this manner.

The Old Lick Run Coal and Coke Company, Palmer, W. Va., was incorporated with \$500,000 capital stock by William E. Turner and May C. Bothard, Philadelphia, Pa.; Burton L. Hitt, Wilkesbarre, Pa., and others.

At a meeting of the directors of the American Stamping & Enameling Company, Bellaire, Ohio, it was decided to erect a factory in Massillon, Ohio. The directors authorized the immediate construction of the first unit, which will contain complete stamping and enameling equipment. The stamping machinery in the Bellaire plant will be moved to Massillon. The enameling equipment will be new and will consist of 16 muffle furnaces of the largest size now in use.

O. E. Hefner and others are building a foundry at Grafton, W. Va. Machinery will be installed to handle the heaviest kind of work.

W. D. Scott, Martins Ferry, Ohio, manufacturer of mine ventilating fans and high pressure blowers, will build a factory in Aetnaville, Ky., for the manufacture of electrical, repair and general mining supplies.

Specifications for a power house to be constructed at dam No. 11 on the Ohio River at Warwood, W. Va., are ready for inspection at the United States engineers' offices, Wheeling, W. Va.

At a meeting of the stockholders of the Wheeling Mold & Foundry Company, Wheeling, W. Va., it was decided to increase the working capital \$250,000. In January the capitalization was increased from \$750,000 to \$1,000,000 and the difference, which has been held in the treasury, is the stock to be sold. The stockholders were given an opportunity to subscribe for this stock to the extent of one-third of their original holdings, and 7200 shares accepted their proportion of the new issue.

Birmingham

BIRMINGHAM, ALA., March 23, 1914.

In Alabama and adjoining States spring has brought forth an unusual amount of structural operations of great variety and the machinery trade has begun to feel the effect. Recovery continues gradual but apparently along firm and stable lines. Machine tools are in better demand and there is a real business in gasoline engines and small machinery. There is promise of extensive railroad development in Alabama and Mississippi during the summer. In the machinery line no such expansion is looked for. General conditions are an improvement over February.

The Town Commissioners, Wilson, N. C., will receive bids until March 31, for electric power plant and equipment.

The board of bond trustees, Jacksonville, Fla., will remodel the substation power plant. Bids are open until April 6.

The Credille-Fowler Power & Mfg. Company, Fort Gaines, Ga., has been chartered by W. T. Credille, M. L. Fowler, H. McRae and M. M. Smith. It is proposed to establish a power and lighting plant. The capital stock is \$25,000.

The city of Milton, Fla., has voted \$20,000 of electric light and water bonds.

The city of Columbia, S. C., has voted \$500,000 of bonds for water works and sewerage extension.

The city of Wilmington, N. C., has authorized the purchase of a new pump.

The Benson Electric Light Company, Benson, N. C., has been incorporated with a capital stock of \$50,000 by W. S. Murchison and others to build and operate a municipal electric light plant. A 50 hp. plant, Fairbanks-Morse equipment, has been purchased.

The mayor, Mountain Creek, Ala., has received bids for \$25,000 of bonds, issued for water works.

The Cowell Woodenware Company, Fayetteville,

N. C., has been incorporated by J. C. Cowell and others for the manufacture of pails, tubs, etc. A factory will be built and the following equipment purchased: a full line of pail and tub machinery, pulleys, belting, shafting, hangers, and one 60 to 75 hp. engine.

The town of Rocky Mount, N. C., will install a municipal gas plant at an estimated cost of \$65,000.

The city of Vantboro, N. C., will install an electric lighting plant.

The town of Virginia Beach, Va., will receive bids for furnishing and installing one 15 hp. gasoline engine and one 6-in. dredge pump with connections. B. P. Holland should be addressed.

The Central South

LOUISVILLE, KY., March 24, 1914.

The general condition of the machinery market in this territory is quiet, but prospects remain good. The demand for power equipment, including boilers and electrical apparatus, has fallen off somewhat, but the call for machine tools is looking up. The opening of the automobile season is developing a good many inquiries from automobile repair shops, a number of which usually start up at this time of the year. The building situation is looking better than for some time, and boiler men expect to get a good deal of business in connection with heating plants for large structures. The most active line for special equipment is wood-working machinery, a number of new plants of this kind being in prospect.

B. M. Henry, manager of the Louisville plant of the American Oak Leather Company, is ready to purchase a generator, motors and other electrical equipment in connection with the electrification of the company's large tannery here.

The E. T. Slider Company, Louisville, is in the market for a crusher to be used in handling gravel. The company has purchased the necessary power equipment for its operation.

The Jefferson fiscal court, Louisville, will shortly let contracts for the installation of two electric elevators in the county courthouse.

The Harlan Coal Mining Company, Starks Building, Louisville, is planning the installation of a 12-ton ice machine at its Croxton, Ky., plant. It may also enlarge its electric power plant there.

The Louisville Axe & Tool Company is in the market for a forging machine, and may install other metal-working equipment later. A brick addition will be added to the factory in the near future. J. D. Augustus is secretary.

The Jefferson Woodworking Company, Louisville, will add to the capacity of its factory during the spring, constructing a reinforced concrete addition equipped with motor-driven wood working machinery. Elevators will be needed for the addition. C. C. Mercke is president.

The Fireproof Storage Company, Louisville, will erect a reinforced concrete warehouse, probably six stories, at Fourteenth and Walnut streets. Moore & Dunford, Otis building, Chicago, are drawing the plans. Elevators will be the principal equipment item. J. Morris Robinson is manager.

The C. C. Mengel & Brother Company, Louisville, mahogany manufacturer, is planning the installation of equipment for excelsior manufacture. Both power and special equipment will be required.

Refrigerating equipment will be purchased by the Zapp & Short Company, Louisville, grocers, for installation in a new store at Fourth and Chestnut streets. The equipment will probably be motor-driven.

The board of education, Louisville, has sold \$1,000,000 worth of bonds, and will proceed with the construction of the school buildings authorized. The first is the boys' high school building, 150 x 358 ft., reinforced concrete, which will be equipped with heating plant, ventilating equipment, shower baths, etc., at an estimated cost of \$300,000. J. Earl Henry is architect.

The Crown Motor Car Company, Louisville, has purchased the plant of the Ohio Falls Motor Company, New Albany, Ind., and will operate it. Additional

equipment, including electric motors, will be purchased. The Mill City Cotton Mills Company, New Albany, Ind., has been organized by J. E. Wiley and others, and is operating a small plant for the manufacture of rugs. It is planned to enlarge it by the installation of additional power and weaving equipment. A gasoline engine furnishes the power at present, but this will probably be replaced with a 200 kw. generator.

The Barbourville Light & Power Company, Barbourville, Ky., has purchased a 75 kw. alternator set, etc. Some additional equipment will be needed later.

M. G. Weisiger, Danville, Ky., is planning the erection of a four-story hotel building, which will be equipped with an electric elevator.

Oakdale, Ky., a Louisville suburb, is planning the sale of an electric franchise May 1. J. O. Hagan is mayor.

The Illinois Central Railroad, 135 Park Row, Chicago, is reported to have plans for the establishment of large shops at Paducah, Ky., where all of the locomotive and car repairs on the southern divisions of the road will be handled. The proposed shops will employ 5000 men, it is stated.

Garry Eberman, Morgantown, Ky., is reported to have plans for the establishment of an ice factory with a daily capacity of ten tons.

Brown Bros., Elizabethtown, Ky., are building an ice factory. They are to install a freight elevator in the building.

The Hurst Wholesale Grocery Company, Richmond, Ky., will elect a four-story building at Winchester, Ky., for which an elevator will be required.

The Kentucky Public Service Company, Bowling Green, Ky., is preparing to make changes in its plant at Frankfort, Ky., discontinuing the generation of current there, and installing transforming equipment for handling current from the Lexington, Ky., Utilities Company's plant.

The North Star Ice Company, Knoxville, Tenn., is planning to increase the daily capacity of the plant from 50 to 100 tons. Y. H. Shanklin is president.

The town of Columbia, Ky., is in the market for a steam stone crusher to be used in street building operations. Address the clerk of the council.

The Wolfe Valley Coal Company, Jackson, Ky., is being organized for the development of coal operations on a 2200-acre tract near that point. A power plant is to be built. W. E. Canning, Jackson, is engineer. Operations are to commence in the immediate future.

The Washington fiscal court, Springfield, Ky., will receive bids April 1 for a 10-ton, 16-hp. steam road roller; two rock crushers, with steam engine; one rock crusher operated by a gasoline engine, and one gasoline engine.

The town of Sebree, Ky., will install a water system. The mayor may be addressed for details.

The Southern Foundry & Machine Company, Lexington, Tenn., will rebuild its factory, and will be in the market for the following machines: Lathes, drill presses, emery stands, milling machines, cold saw machines, and miscellaneous small tools. E. Jones is general manager.

The South Pittsburg, Tenn., Bottling Company is in the market for a motor and water heater. D. Y. Conatser is president.

C. G. Samuel, McDonald, Tenn., is interested in a company which is preparing to establish a limestone-crushing plant at Ooltewah, Tenn.

A. B. Lamb, Paris, Tenn., is preparing to construct a garage, and will be in the market for machine tools for an auto repair shop.

H. M. Nicholas and Allen Brown, Franklin, Tenn., are now purchasing equipment for a creamery and cheese factory. Refrigerating machinery is among the items needed.

R. F. Graf, Knoxville, Tenn., is architect for a six-story building to be erected for the House-Hasson Hardware Company. Elevators will be installed.

E. M. Chany and S. G. Harris are organizing a company which will establish a planing-mill at Big Rock, Tenn. Power and wood-working machinery will be needed.

St. Louis

St. Louis, Mo., March 23, 1914.

Business in the machine tool market has shown no strong evidence of improvement; but it has maintained a level, showing that there is no disposition to eliminate all extension or improvement because of the rather hesitant condition of capital. Inquiries, which were fairly well distributed through the St. Louis territory, were not greater than of late nor large individually. Dealers are reporting that, general conditions considered, the business moving is reasonably satisfactorily. New enterprises are beginning to increase in number and there will probably be some demand of this character in addition to the present small demand. Second-hand material is in fair request. The Wagner Electric Company, St. Louis, has plans for an addition to its plant, 45 x 272 ft., to cost about \$100,000, exclusive of the building.

The St. Louis Screw Company, St. Louis, has begun additions to its plant which include a complete screw and bolt factory and a rolling mill to turn out bars and rods for the factory and to supply the trade. The range of the mill will be from $\frac{1}{4}$ in. to $3\frac{1}{2}$ in. diameter. The present plant will be continued until the new plant is completed.

The Western Wire Products Company, St. Louis, has been incorporated with a capital of \$75,000. It has acquired a factory and will equip for the manufacture of bed springs, cotter pins, door mats and other wire goods. I. J. Young is president.

The Shiras Electric Company, St. Louis, announces the acquisition of the plant of the Chicago Gas & Electrical Fixture Company, Chicago, Ill., which it will remove to St. Louis. The Shiras Company has increased its capital stock to \$150,000 in connection with the change.

The New Luster Mfg. Company, Kansas City, Mo., has been incorporated with a capital stock of \$25,000 by N. S. Wright and others, and will manufacture specialties.

The city of Poplar Bluff, Mo., has formally issued \$75,000 bonds for the equipment of a municipal light plant.

Plans are under consideration by the receivers of the Wabash Railroad for the re-establishment of the repair shops at Moberly, Mo., which were burned recently with a loss of about \$200,000 on equipment.

The Arkansas Lime Company, Ruddels, Ark., will enlarge its plant, adding considerable equipment. Dickinson & Watkins, Little Rock, Ark., are the engineers.

The Skiatook Garage Company, of Skiatook, Okla., is reported in the market for garage and repair shop equipment, including autogenous welding outfit.

The Moccasin Tracks Oil & Gas Company, Sapulpa, Okla., is in the market for an engine and other equipment. H. H. Harbison is manager.

The city of Stratford, Okla., will expend \$29,000 on a water works plant. The Benham Engineering Company, Oklahoma City, Okla., is the engineer.

The city of Cordell, Okla., will extend its water works, plant, etc., at a cost of about \$50,000. The Benham Engineering Company, Oklahoma City, Okla., is the engineer.

The Fremont Motor Company, Oklahoma City, Okla., has been incorporated with a capital stock of \$10,000 by B. Fremont and others and will equip a repair plant.

The Moore's Cotton Chopper Company, Hattiesburg, Miss., has been incorporated with a capital stock of \$40,000 by E. K. Moore, A. B. Eubanks and others and will equip for the manufacture of a special device.

The city of Tunica, Miss., of which M. J. Alexander is clerk, is preparing to construct water works. Fairbanks & Co., New Orleans, La., is the engineer.

The water works plans for the city of Vicksburg, Miss., have been practically completed by the Dabney Engineering Company, Memphis, Tenn., and will involve an expenditure of about \$340,000.

The city of Eunice, La., will receive bids until April 16 for equipment for an electric light plant, including

generators, etc. E. M. Kurchedt, New Orleans, La., is the engineer.

The General Cooperage & Lumber Company, New Orleans, La., has been incorporated with a capital stock of \$100,000 to equip cooperage plants, etc.

The city of New Iberia, La., will install a purification plant and add equipment to its water works.

The city of Hammond, La., will install two oil pumps with engines of a capacity of 750 gal. per min. each. Xavier Kramer, Magnolia, Miss., is supervising engineer.

The Alexandria Electric Street Railway Company, Alexandria, La., will equip a power plant in connection with the Bayou Rapides Lumber Company.

Texas

AUSTIN, TEXAS, March 21, 1914.

The condition of the machinery and tool trade is generally satisfactory. The business and industrial situation continues to improve, but the usual spring awakening has not been felt thus far. Crop conditions are good, although rain is needed in some parts of the State.

The Texas Power & Light Company, Brownwood, will install equipment costing \$5000 which will double the capacity of the plant.

The Texas Power & Light Company, Sweetwater, will make improvements to its power plant.

An issue of \$500,000 of Beaumont water works bonds has been approved by the Attorney General for improvements and enlargement of the present plant at Austin, Texas.

The secretary of the Town Council, Ballinger, Texas, has been instructed to call for bids on a new pump of 1000 gal. per min. capacity for the water works.

The town of Runge is preparing to install a water works plant.

The Santa Fe Railroad will construct a water works plant at Flagstaff, Ariz., at a cost of \$165,000.

R. L. Dennison, Dayton, Ohio, is organizing a company to erect a brick and tile manufacturing plant at Port Arthur. The company will have a capital stock of about \$300,000.

The Greenville Gas Company, Greenville, will make extensive improvements.

A. F. Aycock and W. B. Blair, Ballinger, are in the market for pumping machinery for irrigation.

The United Timber & Kaolin Association has been incorporated with a capital stock of \$2,000,000. It will erect a kaolin mill with an initial grinding capacity of 200 tons of kaolin daily, a firebrick plant, a box factory and a saw mill at the new town of Camp Wood Creek. The Uvalde & Northern Railway Company has been organized with a capital stock of \$60,000 to furnish transportation for the various industries. William Cassin, Will A. Morriss and Fred C. Adams, of San Antonio, and others are the trustees.

The Beaumont Box Mfg. Company, Beaumont, has been organized with a capital stock of \$20,000 and will erect a factory. S. J. Smith and others are the incorporators.

San Francisco

SAN FRANCISCO, Cal., March 17, 1914.

The machine tool situation appears hardly as favorable as it did a few weeks ago, owing rather to the absence of expected business than to any actual curtailment. Several important inquiries have been held up indefinitely, and there is nothing of special interest now in the market, while the regular run of small business has been disturbed by the sale at auction of a large lot of second hand tools brought from the East. The demand for tool steel, abrasives and general shop supplies is light, and many local machine shops are employing only a fraction of their normal forces. Dealers continue to predict a large business, but say it will be midsummer before the more important deals can be closed. In the general trade the most satisfactory line

at present is mining machinery, which is moving exceptionally well. Travelers returning from the Nevada mines report better prospects than for several years. Pumping machinery is receiving more attention, though hardly as active as last year. Much business was expected in connection with construction and reclamation work, but so far few orders have been placed.

Considerable interest is taken in the project for a new drydock to be built by the Union Iron Works at Hunters Point, contingent upon the closing of a contract for navy repair work. The dock, it is announced, will cost \$1,500,000 or more, and will require considerable auxiliary equipment, though whether any new tools are contemplated is not known. By frequent single tool purchases the Union Iron Works has kept its shop equipment in very efficient shape.

The Pacific coast office of Manning, Maxwell & Moore, San Francisco, has opened a branch in the Mutual Life Building, Seattle, Wash., under the supervision of Louis Walber, to cover the north Pacific States. Louis G. Henes, Pacific coast representative, will leave shortly for an Eastern trip.

The Hampton Electric & Machine Company, San Francisco, specializing in the installation of electric motors and machinery, has opened a branch office and shop in Oakland.

The town of Azusa, Cal., has voted \$55,000 for extension of the city's light and water plant.

The Chicago Pneumatic Tool Company has taken an order for a 250 hp. direct-connected motor compressor for a Tonapah mine, and is shipping two large compressors and an equipment of rock drills to the Hawaiian Islands. Several orders have been taken in Nevada lately for this company's new portable mine hoists.

The plant of the Globe Iron Works, Sacramento, Cal., which changed hands recently, has resumed work under the new management, specializing in ore cars, pumps and engines.

E. N. Warr has applied for a permit to use a tract of waterfront land on Los Angeles harbor for marine construction and repair shops.

The Arizona Venture Corporation, Kingman, Ariz., is installing a large outfit, including generator and motors, hoist, drills and compressors and a milling plant.

The city of Pasadena, Cal., is taking figures on a two-stage centrifugal pump of 1250 gal. per min. capacity, 185-ft. head; also for a 125 hp. electric motor.

The town of Fowler, Cal., is taking figures on a new waterworks pump and motor.

The Mt. Whitney Power Company is preparing to equip a substation at Strathmore, Cal., with two 500 kw. transformers.

The town of Santa Ana, Cal., has sold \$63,000 of water works improvement bonds.

The Pacific Northwest

SEATTLE, WASH., March 17, 1914.

The shingle workers' strike in the Willapa and Gray's Harbor districts has been called off and the men have returned to work. The strike in the shingle mills of the Everett district remains unsettled, but it is thought a settlement will be reached before the end of the week. In the Bellingham country, it is understood all trouble clouds have been dissipated. Local machinery houses report an excellent week, especially in milling machinery. Heavy shipments to Alaska and British Columbia points were made. Collections in this section are reported fair.

The Kriedler Lumber & Construction Company, Seattle, has been incorporated by A. C. Kriedler and others with a capital stock of \$50,000. It is understood that a large lumber mill will be built.

The West Coast Wire Rope Works, Tacoma, Wash., has been incorporated by J. M. Anderson and C. Jones. It is stated the company expects to erect a large factory.

G. B. Hegardt, engineer of the dock commission, Seattle, has been authorized to advertise for bids for five electric winches, costing approximately \$2100 each; one rotary transformer, estimated at \$2500, etc.

The Tacoma Central Steam Heating Company, Tacoma, Wash., has been granted a franchise by the City Council to construct a \$375,000 system to furnish steam, hot water heat and hot water for domestic purposes.

Cedargreen Bros., of Wenatchee, Wash., are having plans prepared for the erection of a four-story and basement brick ice and cold storage plant.

The C. F. Massey Company, Spokane, Wash., manufacturer of concrete products, plans the enlarging of its factory. Some new machinery will be installed to increase its capacity.

The city councils of Chelan and Lakeside, Wash., will co-operate in the installation of a municipal light and water plant to serve both cities. It is stated that competitive bids covering the system will be asked for. Mayor Emerson, of Chelan, and Councilman H. E. Ward, of Lakeside, are the committee in charge.

Harris & Sons, owners of the Milton box factory, Walla Walla, Wash., plan the construction of a large addition. Some new machinery will be installed to increase its capacity.

The Forest Grove Fruit Growers' Association, of Forest Grove, Ore., is having plans prepared for the erection of a new warehouse, and the association will purchase considerable new machinery to be used in it. H. C. Atwell is president and manager.

The Inland Empire Biscuit Company, Spokane, Wash., will start work soon on an additional story to its factory at an estimated cost of \$25,000. It will add several machines to increase the output. Albert Heid is the architect.

The mill of the North Yakima Milling Company, North Yakima, Wash., was completely destroyed by fire, causing a loss of \$100,000. Alexander Miller, the president, states that it will be rebuilt.

Anderson Brothers, Newport, Wash., are completing plans for the erection of a sawmill, with a capacity of 20,000 ft. in 10 hrs.

Portland officials of the Southern Pacific Railroad state that funds are available to begin the electrification of the Portland, Eugene & Eastern Railroad. Shops will be immediately established at Springfield, and the work rushed.

The city of Eugene, Ore., will start work on extensive improvements to its water system, for which a \$100,000 bond issue has been sold. Plans include an additional pump.

The Eugene Electric Cone Mfg. Company, Eugene, Ore., has been incorporated with a capital stock of \$20,000 by F. H. Miller, Ernest House, and others, of Eugene. It is stated it plans the erection of an electrically operated factory.

According to announcements, H. W. Whitcomb, Portland, and W. L. Mars, Coeur d'Alene, Idaho, will purchase the old lighting plant owned by E. P. Atkinson, Culdesac, Idaho, and place it in operation. New machinery and extensions will be necessary.

The city engineer, Miles City, Mont., will advertise for bids for a new 200 kw. generator, at an estimated cost of \$1800.

City Engineer Birkland, Lewistown, Mont., has submitted plans for an electric light system. Work will begin soon.

B. C. Lillis, engineer, Billings, Mont., has prepared plans for a pumping plant, etc., for Hardin, Mont.

The Twin Falls Milling & Elevator Company, Twin Falls, Idaho, will make changes and improvements, including installation of some machinery. L. L. Breckenridge is manager.

Eastern Canada

TORONTO, ONT., March 21, 1914.

The Niagara Falls Silk Mills Company will erect a mill at Brantford, Ont., about April 1. It will be 52 x 165 ft., three stories.

The Canadian Northern Railway, Toronto, has decided to build an independent coal plant at Quebec, Que., for the Quebec & Lake St. John Railway, at an estimated cost of \$60,000.

The Niagara Linen Company, Niagara Falls, N. Y.,

is building a branch factory at Niagara Falls, Ont., to cost about \$50,000.

The Standard Pulp & Lumber Company, Ltd., Montreal, has been incorporated with a capital stock of \$1,000,000 by Charles Beauchemin, Joseph A. Richard, Philias Lavigueur, and others, to manufacture pulp, paper, etc.

Masson, Ltd., Quebec, Que., has been incorporated with a capital stock of \$50,000 by Damase Masson, J. B. H. Lamere and others, of Montreal, to manufacture steel, ornamental iron, etc.

The Montreal Box Board Company, Ltd., Montreal, has been incorporated with a capital stock of \$500,000 by John W. Blair and Francis J. Laverty, of Westmount, Que., Charles A. Hale, of Montreal, and others, to manufacture paper, etc.

James Adam, Ltd., Montreal, has been incorporated with a capital stock of \$75,000 by George L. Alexander, Harry Caulfeild, and others, to construct electric power plants, bridges, etc.

The Dreadnot Motor Trucks of Montreal, Ltd., Montreal, has been incorporated with a capital stock of \$100,000 by Edward S. Ross, Eugene R. Angers, and others, to manufacture automobiles, motor cycles, engines, etc.

The Kingston Iron & Tube Company, Ltd., Kingston, Ont., has been incorporated with a capital stock of \$1,000,000 by James E. Day, John M. Ferguson, Edwin F. McDonald, and others, of Toronto, to manufacture iron, steel, etc.

The Canadian Metal Products, Ltd., Guelph, Ont., has been incorporated with a capital stock of \$100,000 by Charles L. Dunbar, Edward Tatham, and others, to manufacture and deal in iron, steel and other metals.

The Humphrey Bicycle & Motor Company, Ltd., Toronto, has been incorporated with a capital stock of \$100,000 by George H. Sheppard, Thomas J. Wright, and others, to manufacture motor trucks, motor cars, etc.

The Lake Shore Sand & Gravel Company, Ltd., Toronto, has been incorporated with a capital stock of \$250,000 by Armour M. Miller, George T. Denison, and others, to manufacture brick, terra cotta, etc.

The Mineral Springs Sand & Gravel Company, Ltd., Hamilton, Ont., has been incorporated with a capital stock of \$40,000 by James L. Sibald, Ralph R. Bruce, and others, to manufacture sewer pipes, cement, etc.

The Canada Casket Company, Ltd., Warton, Ont., has been incorporated with a capital stock of \$300,000 by William H. Irving, Henry H. Davis, and others, of Toronto, to manufacture caskets and undertakers' sundries.

The Hope Mfg. Company, Ltd., Toronto, has been incorporated with a capital stock of \$40,000 by Philip B. Wood, Alexander H. McCrimmon, and others, to manufacture sash, doors, etc.

The Whyte Foundry Company, Ltd., Toronto, has been incorporated with a capital stock of \$40,000 by James A. Kent, James M. Langstaff, and others, to manufacture rails, rolling stock, etc.

The Du Pont Fabrikoid Company has been incorporated in Ontario with a capital stock of \$100,000 to manufacture artificial leather, etc. William A. Cotton, Toronto, is its attorney.

The Cole-Buckhorn Machine Company has been incorporated in Ontario with a capital stock of \$12,500 to manufacture seed cleaning and seed separating machines, etc. W. R. P. Parker, Toronto, is its attorney.

The rate-payers of Strathroy, Ont., have passed a by-law to grant \$25,000 for the erection of an electric light and power plant.

The Brompton Pulp & Paper Company, East Angus, Que., will add 60 tons of news print per day to the capacity of its factory. J. A. Bothwell is general manager.

The plans of the Canadian Alkali Company's \$500,000 factory, which will be erected at Sandwich, Ont., this year, have been placed before the Sandwich Town Council. The company will employ between 300 and 400 men at the start.

Fire totally destroyed the plant of the John Goodison Thresher Company, Sarnia, Ont. The loss is estimated at \$250,000.

The mill of the Laidlaw Lumber Company, Eastern avenue and St. Lawrence street, Toronto, was destroyed by fire. The damage to mill and machinery is estimated at \$50,000.

La Rigaud Electric & Milling Company, Ltd., Rigaud, Que., has been incorporated with a capital stock of \$149,000 by J. A. Bourbeau, A. Mercier, J. Lafleur and others.

It is announced that the Dominion Government will buy the plant of the Truro Engineering Company, Ltd., Truro, N. S., and turn it into a repair plant for the Nova Scotia Eastern Railway.

Western Canada

WINNIPEG, MAN., March 20, 1914.

Tenders will be received by the Mount McKay Products Company, Ltd., March 28, for the erection of a crusher plant at the base of Mount McKay. Antwerp & Co., Murray block, Fort William, Ont., have the plans and specifications.

The Furbishing Company, Ltd., Winnipeg, Man., has been incorporated with a capital stock of \$40,000 by Samson L. Head, Thomas Shannon and others to manufacture machinery.

Nelson & Foster, Ltd., Winnipeg, Man., has been incorporated with a capital stock of \$60,000 by Nicholas Nelson, Frederick A. Foster and others to manufacture office and store fixtures, etc.

Further additions to the Jordan River plant of the Vancouver Island Power Company, Victoria, B. C., will be commenced within a short time to provide for the third unit. This will bring the aggregate capacity of the plant to 25,000 hp., and will complete the installation of the 13,000 hp. authorized increase to the original plant.

The British Columbia Portland Cement Company contemplates enlarging its plant at Princeton, B. C.

James Brooks, manager Westminster Woodworking Company, New Westminster, B. C., states that work will begin shortly on a factory to cost \$50,000 to replace that recently destroyed by fire.

E. W. Bull, superintendent of light and power, Regina, Sask., will receive bids until March 28 for furnishing generating equipment for the electrical department.

Plans are being prepared for an addition to the municipal electric generating station at Medicine Hat, Alta.

Bids will be received by W. H. Stiles, secretary, Humboldt, Sask., until April 15 for erecting pumping station and furnishing and installing pressure filters, pumps, etc.

Government Purchases

WASHINGTON, D. C., March 23, 1914.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until April 21, schedule 6566, for one steam fire pump for Lake Denmark, N. J., and schedule 6568, for one welding equipment for Norfolk; until May 5, schedule 6563, for miscellaneous fire and bilge pumps, and schedule 6564, for two turbo-generator sets, all for Mare Island.

The Paymaster General, Navy Department, Washington, will open bids March 31, schedule 6495, ordnance, class 92, for one 5-ft. full universal radial drill for Washington; class 93, for two 3 x 36 flat turret lathes for Washington; class 94, for one boring and turning lathe complete, for Washington; alternate, classes 92, 93 and 94, with electrical equipment to comply with the standardization rules of the American Institute of Electrical Engineers; schedule 6497, steam engineering, class 11, for one portable motor-driven milling machine for Norfolk; schedule 6459, steam engineering, class 11, bid A, 12 turbine-driven, forced draft blowers with spares, duty paid, for Brooklyn.

The quartermaster, U. S. Army Recruit Depot, Fort Slocum, N. Y., will receive triplicate proposals until April 18, for the construction of a coal handling plant

and miscellaneous buildings. Information and particulars may be obtained from the same source.

The light-house inspector of the Eleventh District, Detroit, Mich., received bids March 6, for furnishing two sets of direct-connected oil engine-driven dynamos, as follows: Fairbanks, Morse & Co., \$775.

Bids were received March 14 by the chief of the Bureau of Yards and Docks, Navy Department, Washington, for furnishing a compressed air locomotive and accessories for delivery at the U. S. Naval Station, Pearl Harbor, H. T., as follows:

Item one, price for locomotive, air compressor, flat cars, air pipes and fittings, complete; item two, locomotive complete; item three, air compressor complete; item four, flat cars complete; item five, air pipes and fittings.

Ingersoll-Rand Company, item three, bid A, \$2270; B, \$2325; C, \$2249; D, \$2259.

Norwalk Iron Works Company, item three, \$1696; alternate \$1772.

Wm. J. Oliver Mfg. Company, item four, \$2744.

H. K. Porter Company, item two, \$2755; item five, \$1450.

Magor Car Company, item four, \$1700.

Seattle Car & Foundry Company, item four, \$1840.

Laidlaw-Dunn-Gordon Company, item three, \$2865.

Orenstein-Arthur Koppel Company, item four, \$428 each.

The following bids were received by the depot quartermaster, San Francisco, under office circular No. 132, item 25, opened March 9, for one duplex steam pump:

J. Aaron & Co., \$204; F. Bissell Company, \$137.50; Bethlehem Steel Company, \$367.50; F. E. Brandis Sons & Co., \$164.90 and \$229.90; William M. Bird & Co., \$233; Baer Brothers, \$145.

Bids were received at the Bureau of Supplies and Accounts, Navy Department, Washington, on March 17 for furnishing material and supplies for the navy yards as follows:

Schedule 6401—Construction and Repair

Class 103, Brooklyn—Bid A—Furnishing and erecting electric gantry crane, maximum lift of hook 40 ft.—Bid 30, \$7985; 73, \$10,480; 93, \$11,500; 179, \$12,654; 197, \$12,200; 255, \$13,250; 272, \$9340.

Alternate Bid A—Do, maximum lift of hook 25 ft.—Bid 31, \$7885; 73, \$9305; 93, \$10,920; 179, \$11,977; 197, \$11,300; 255, \$12,750; 272, \$8650.

Bid B—Furnishing only 1 crane, maximum lift of hook 40 ft.—Bid 31, \$6785; 73, \$9830; 93, \$10,200; 179, \$11,304; 197, \$10,635; 255, \$11,500; 272, \$8160.

Alternate Bid B—Do, maximum lift of hook 25 ft.—Bid 31, \$6685; 73, \$8655; 93, \$9620; 179, \$10,307; 197, \$9835; 255, \$11,000; 272, \$7495.

Bid C—For erecting electric gantry crane, maximum lift of hook 40 ft.—Bid 93, \$1300.

Alternate Bid C—Do, maximum lift of hook 25 ft.—Bid 93, \$1300.

Schedule 6407, Steam Engineering

Class 21, Mare Island—Parts for refrigerating plant—Bid 257, \$114.54; 264, units, part; 267, \$984.65.

Alternate—Do, f.o.b. works—Bid 66, \$812.24; 226, informal; 257, \$965.50.

Schedule 6441, Yards and Docks

Class 61, New London—One engine-driven centrifugal pump—Bid 13, \$945; 18, \$625; 27, \$707; 44, \$625, \$675, \$595, \$545, and \$825; 64, \$715; 70, \$806, \$863, \$729, and \$850; 89, \$870 and \$920; 94, informal; 160, \$493; 212, \$505 and \$585; 233, \$704.70 and \$516; 309, \$820, \$720, \$662, and \$515; 311, informal.

Schedule 6443, Steam Engineering

Class 81, Norfolk—One vertical duplex double-acting pump and one vertical simplex do—Bid 44, \$1545 and \$1630; 80, \$1319.25; 281, \$2586; 290, \$1950.

Schedule 6449, Navigation

Class 103, Annapolis—One precision bench lathe—Bid 107, \$374 and \$355.

Schedule 6458, Construction and Repair

Class 171, Brooklyn—One pneumatic compression punch—Bid 31, \$515; 237, informal.

The names of bidders and the number under which they are designated in the above list are as follows:

13. Alberger Pump & Condenser Company.
18. Buffalo Steam Pump Company.
27. Blackall & Baldwin Company.
30. Baer Brothers.
31. F. A. Branda & Co.
44. Blake & Knowles Steam Pump Works Company.
64. A. S. Cameron Steam Pump Works.
66. Central Construction & Supply Company.
70. Camden Iron Works.
73. Cleveland Crane & Engineering Company.
80. Dean Brothers Steam Pump Works.
89. D'Olier Centrifugal Pump & Machine Company.
93. Exeter Machine Works.
94. Epping-Carpenter Company.
107. Frevort Machinery Company.
160. Lawrence Pump & Engine Company.
179. Manning, Maxwell & Moore.
197. Niles-Bement-Pond Company.
212. Providence Engineering Works.
226. Ruemmel-Dawley Mfg. Company.
233. B. F. Sturtevant Company.
255. Toledo Bridge & Crane Company.
257. United Iron Works.
264. Vulcan Iron Works.
272. Whiting Foundry Equipment Company.
281. Warren Steam Pump Company.
290. M. T. Davidson Company.
309. Platt Iron Works Company.
311. Darrow & Comstock.

Trade Publications

Pumps.—Blake & Knowles Steam Pump Works, 115 Broadway, New York City. Pamphlet No. BK-894-25. Illustrates a line of single horizontal pressure, boiler feed, tank and air pumps. There is practically no descriptive matter in the pamphlet, a single page being given to an illustration of each type of pump with a condensed table of specifications. The structural features of the pump are also shown.

Milling Attachments and End Mills.—Porter-Cable Machine Company, Syracuse, N. Y. Four folders. Pertain to a line of universal milling attachments which can be used on different types of milling machines. All of the attachments are illustrated and described and there are views showing it applied to the machine. The remaining folder illustrates high speed and carbon end mills and micro-adjustable boring heads for use in connection with the boring of holes in jigs, fixtures, etc. Specification tables are also included.

Bolts, Nuts and Rivets.—Hoopes & Townsend Company, 1330 Buttonwood street, Philadelphia, Pa. Catalogue No. 27. Relates to a line of bolts, nuts and rivets, in which each article or class is arranged by itself with a view to giving prices, weights, sizes and numbers on one page. All of the standard lines are covered, and in addition washers, chain links and keys are also featured. A number of tables of useful information, such as the shearing value of rivets, shearing and tensile strength of bolts, weights of various kinds of bolts and shapes of iron, decimal equivalents and conversion tables are included.

Surface Grinding Machines.—Blanchard Machine Company, 64 State street, Cambridge, Mass. Pamphlet. Contains a number of brief descriptions of grinding operations that have been performed by this machine which was illustrated in *The Iron Age*, October 13, 1910. A number of views of typical parts that have been ground are also given, with data on the material, besides the amount of work that was done and the rates at which it was produced.

Well Drilling Machinery and Tools.—Sparta Iron Works Company, Sparta, Wis. Catalogue No. 40. Supersedes all previous catalogues and circulars and pertains to a line of machines for drilling wells or prospecting for minerals, oil or gas, where a light weight, but strong and durable machine is required. The various general features of the machine are briefly touched upon, followed by directions for setting up and operation. Illustrations and condensed specifications are presented of the various styles of machine, including one provided with a traction engine attachment. Rotary and hydraulic jetting outfits are illustrated and considerable space is given to the supplies that are required.

Electric Tools.—Stow Mfg. Company, Binghamton, N. Y. Set of bulletins. Treat of a ½-in. electric breast drilling machine, an electric bench grinding machine, a tool post grinding machine and a radial flexible boring machine which is designed for general shopwork and takes its power from an electric light socket. Views of all the tools are given together with brief descriptions and condensed tables of specifications.

Flexible Tubing and Tool Holder.—T. R. Almond Mfg. Company, Ashburnham, Mass. Circular and pamphlet. The first describes and illustrates a flexible steel tube for conveying lubricating oil, gasoline, grease and gas on various machine tools and automobiles. The materials entering into the tube are briefly described and the different fittings that can be supplied are also shown. The tube is made in four sizes, ranging from ¼ to ½ in. in diameter. The pamphlet describes a holder which can be adjusted to take care of a number of different types of cutting points and place them in different positions. An illustrated description of this tool holder appeared in *The Iron Age*, March 23, 1911.

Distilled Water.—Pure Water Apparatus Company, Philadelphia, Pa. Two folders. The first shows a number of installations of stills for producing pure water for drinking and industrial purposes at a cost of 2½c. per ton. The other is concerned with a number of ice plants in which the still is used to supply pure water.

Castings.—Buffalo Foundry & Machine Company, East Ferry street, Buffalo, N. Y. Pamphlet. Covers a line of castings which are made for a great variety of purposes from gun iron. These include bars, cylinders, pistons and piston rings, superheater headers, journals, bearings, gears, steam hammer and pump parts, etc. All of these are illustrated and briefly described. A number of views of various portions of the shop are also given.

Electric Fans and Ozonators.—Sprague Electric Works of the General Electric Company, 527 West Thirty-fourth street, New York City. Catalogue No. 329, folder No. 852 and bulletin No. 49,000. The first illustrates and describes an extensive line of electric fans for use with either alternating or direct current. These can be supplied in the desk, bracket, oscillating, ceiling and exhaust types. In connection

with each kind an engraving is given, together with a condensed table of specifications. The other two treat of combination portable ozonators for use in connection with the ventilating systems of buildings and houses. The appliances are designed to counteract the objectionable odors arising from cooking, smoking, trade processes, etc., by the introduction of ozone into the ventilating air.

Storage Battery Freight and Industrial Trucks.—Automatic Transportation Company, Buffalo, N. Y. Pamphlet. Covers a line of storage battery trucks designed for the special purpose of handling freight at railroad and steamship terminals, freight houses, manufacturing plants, foundries, mills, wholesale establishments, warehouses and all other institutions requiring trucking about the premises. A brief general description of the construction of the trucks is given, followed by brief descriptions, illustrations and specifications of the several types that are built. A storage battery locomotive for use in connection with industrial railways in and about manufacturing plants, mines, etc., is also mentioned. There are a number of views of the trucks in use for transporting material of different kinds. An illustrated description of a truck for handling freight appeared in *The Iron Age*, May 11, 1911.

Sand Cutting Machine.—Sand Mixing Machine Company, 220 Broadway, New York City. Pamphlet. Points out the advantages of using an auto sand cutting and mixing machine in foundries. A brief description of the construction of the machine, which was illustrated in *The Iron Age*, December 4, 1913, and the way in which it is used are given, the text being supplemented by a number of halftone engravings.

Mine Cars.—Helmick Foundry-Machine Company, Fairmont, W. Va. Pamphlet. Calls attention to a line of mine and stone cars, which are built in nine different types. Engravings of the several cars are given, together with a brief mention of the particular features of each. Views are also included of the two types of self-oiling wheels which are used. In addition to the cars which are illustrated the company is prepared to build special kinds from steel or wood to order.

Fasteners.—McCoy Iron Works, Perth Amboy, N. J. Calls attention to a line of fasteners for corrugated iron and asbestos covered metals. This includes mushroom head nails, clips, bolts, rivets and special fasteners. All of these are illustrated and in addition there is a view showing the way in which the various fasteners are used.

Sheet Metal Stampings.—Crosby Company, Buffalo, N. Y. Pamphlet. Calls attention to the development that has taken place in the past few years in the manufacture of sheet metal stampings as a substitute for the castings that were formerly employed. A list is given of the various stamped automobile parts that can be supplied in steel, brass, bronze, copper and aluminum which contains the names of more than 150 parts. In addition to the work listed the company is prepared to undertake practically anything in sheet metal stamping and deep drawing. An illustrated description of some special stampings made by this company appeared in *The Iron Age*, October 6, 1910.

Metals.—Ajax Metal Company, Philadelphia, Pa. Folder. Treats of a line of metals that includes a great variety of ingot, white and miscellaneous metals and journal brasses. All of these are listed and particular attention is directed to plastic bronze and Bull babbitt metals. The special advantage claimed for the bronze is a diminished tendency to heat, due to an increase of lead and a decrease of tin in the alloy, while the babbitt is claimed to possess high anti-friction properties and great resistance to wear.

Ice Manufacture.—Vilter Mfg. Company, Milwaukee, Wis. Bulletin No. 22-A. Contains a reprint of a paper presented at the annual meeting of the American Society of Refrigerating Engineers on the "Chemistry of Raw Water Can Ice" and points out the precautions that must be observed in manufacturing ice from this source of supply.

Mechanical Rubber Goods.—New York Belting & Packing Company, 91 Chambers street, New York City. Catalogue. Size, 5½x8½ in.; pages, 229. Enumerates the principal goods manufactured in a concise way, complete details being given in a series of special catalogues for the different lines. The products covered include rubber belting, hose for a great variety of uses, packing of various kinds and styles, gaskets, pump diaphragms and valves, mats, tubing, specialties of several kinds and interlocking tiling. Emery wheels composed of rubber and emery grains that have been thoroughly mixed and vulcanized under high pressure are mentioned, as well as a line of fittings for hose. A telegraph code and a complete index are included.

Ores, Metals and Alloys.—C. W. Leavitt & Co., 30 Church street, New York City. Leaflet. Lists a line of ores, metals and alloys, which covers practically the entire range commonly handled. In addition to the extensive line of ferroalloys listed, the company is prepared to handle business in special alloys of all kinds.



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